

skin diver

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TRUE TALES OF COMMERCIAL DIVING

NIGHT DIVING THE
PACIFIC NORTHWEST

MARINE SANCTUARIES
THREATENED WITH
ANNIHILATION

NORTHERN CALIFORNIA'S
OCEAN PINNACLES



SPECIAL SUPPLEMENT ON COZUMEL

Super-Cinch is a Quick Change Artist



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Change tanks in seconds

Super-Cinch is a velcro-padded, 2" nylon web belt with snap-lock lever that slides on or off your tank quickly and easily. No nobs or bolts to adjust. No metal band to scrape or turn. Just slip it on, snap it shut, slip it off, wrap it up. Super-Cinch is so simple it works like magic.

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Super-Cinch loop-lock webbing clip adjusts to all tank sizes. Super-Cinch is standard on Scubapro Stabilizing Jackets, Buoyancy Control Packs, Single Contour Scubapak Harness, and comes in Kit form for assembly on all Scubapro back-packs.

Super-Cinch can be folded flat

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Super-Cinch is simply super!

Send \$2.00 for the new Full-Color Catalog and Free Wetsuit Decal and Car Decal. Scubapro, Dept. SD, 3105 E. Harcourt, Compton, Ca. 90221

SCUBAPRO®



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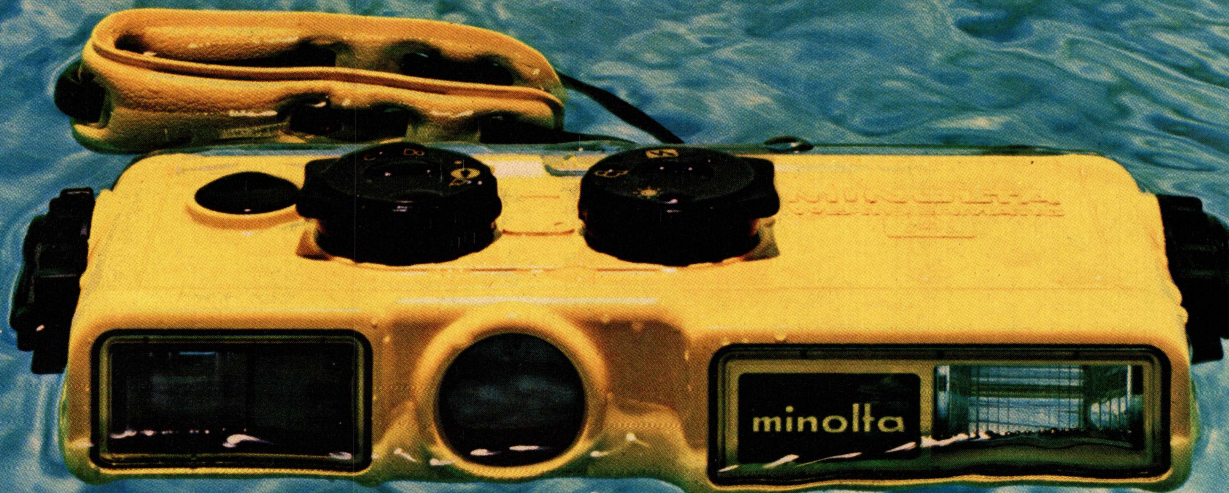
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for more information write to Minolta Corp., 101 Williams Drive, Ramsey, N.J. 07446. In Canada: Minolta, Ontario, L4W 1A4.

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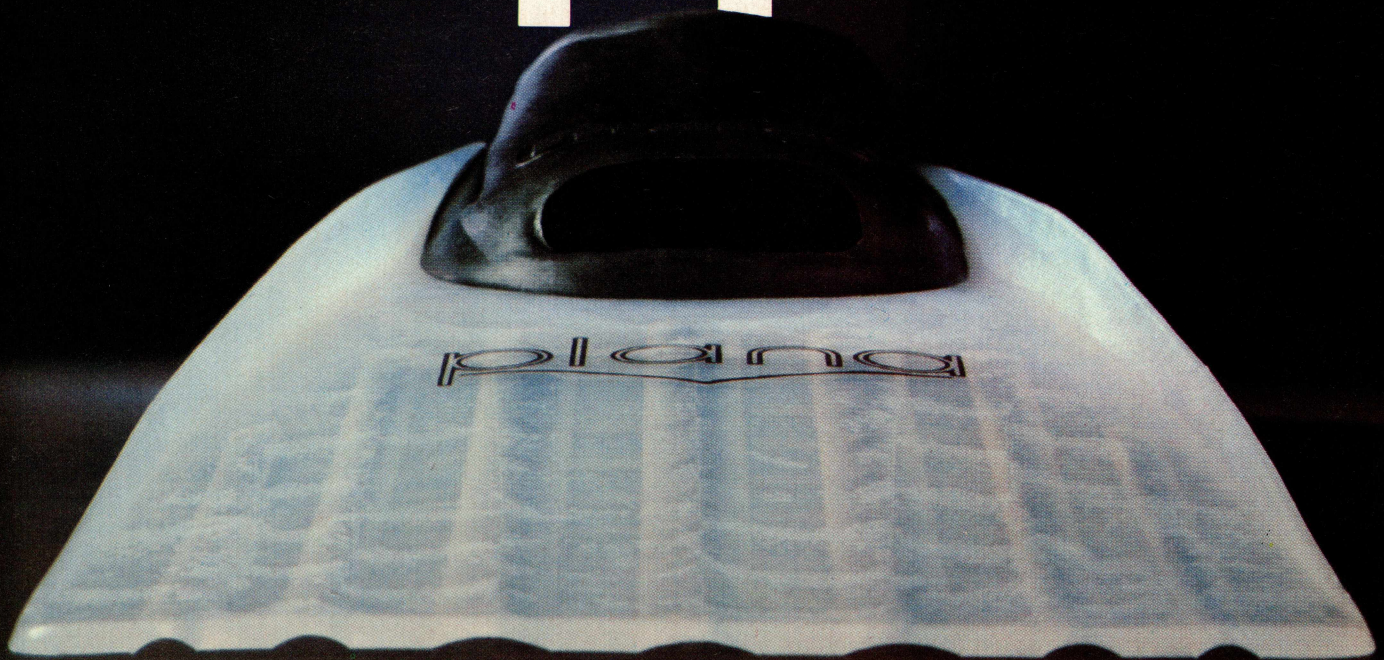
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It's a revolutionary advance in fins.
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After more time and money than
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We call it *The Flipper*.

Half the weight of a rubber fin. More
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Yet of *professional* quality.

The breakthrough came with the
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fiberglass fibers in the blade,
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super-soft in the foot pocket.

The result was a more responsive,
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conventional foot-pocket fins with
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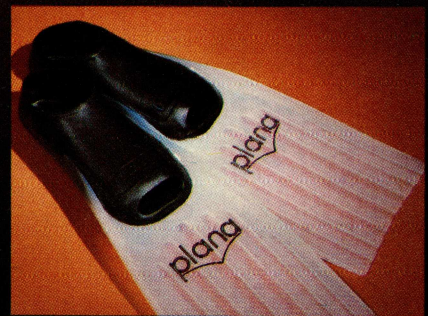
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Volume Twenty-Nine Number Seven

DEPARTMENTS

Rod Anton photographed San Jose, CA diver, Wayne J. "Mike" Michaels, as he descended upon the Pinnacles off Monterey, CA. (See page 58.) Anton used a Nikonos II, 35mm lens, available light.

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SDM Editorial

BY THE PUBLISHER

HOW SKIN DIVER RATES DIVE TRAVEL

Dive resort travel is currently experiencing a tremendous boom. With it has come a new wave of curiosity about resort diving operations, tropical hotels, tour operators, and travel agents. SKIN DIVER is receiving thousands of letters from its readers with questions, comments and, occasionally, complaints. We thought it might be helpful if we explained how SKIN DIVER goes about reporting on a dive resort or facility.

SKIN DIVER assigns its very best writers to the job of covering dive travel and resorts. This cadre of journalists consists of staff writers, contributing editors, and freelance journalists who have extensive knowledge in the area of resort travel. The average skill level of a SKIN DIVER travel writer is 15 years of experience or more.

SKIN DIVER travel assignments are not taken lightly. There is a great deal of money involved since the vacationing diver will pay anywhere from \$400 to \$4,000 for an overseas dive trip and can hardly afford to make a wrong choice. SKIN DIVER travel writers strive for accuracy and comprehensive reportage. They often have to dig for the facts since information is difficult to obtain or virtually non-existent. This is where careful research and seasoned reportage pays off. SDM writers actually travel to the far corners of the world to visit these resorts, examine their reefs and wrecks, and make their own personal evaluations of the facilities and services offered.

Some readers wonder if SKIN DIVER travel writers receive special treatment when they visit a dive resort. The answer is no. SDM's travel writers dive in the same ocean, visit the same reefs, eat the same food and sleep in the same hotel rooms as any other diving guests. The plain fact of life is that most dive resorts have no way of deviating from their normal dive routine. Furthermore, SDM writers are not interested in any special favors — they are attempting to report on those services and underwater attractions which are regularly offered to the diving public.

A few readers have inquired as to why SKIN DIVER travel articles always sound so positive and rarely have anything bad to report. When SDM sends a writer out to cover a dive resort, he or she is not deliberately looking for negative aspects. The writers approach every resort in the same manner as a vacationing diver would. They seek an enjoyable experience and search for those particular underwater attractions which make that destination distinctive and appeal-

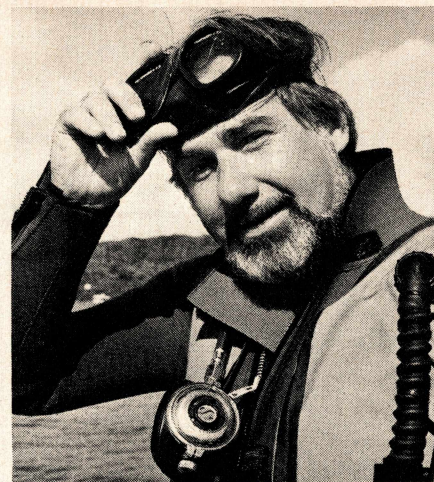
ing. In the majority of instances dive resorts are eager to host and please their guests since their future growth and prosperity depend largely on satisfied customers. In other words, SKIN DIVER's travel articles are not designed to be witch hunts. Divers interested in reading about the ten worst dive resorts in the world, are going to have to find it in some other publication. SKIN DIVER's goal is to tell its readers where the good spots are located and who to contact in order to reach them.

Some readers inquire as to why SKIN DIVER devotes more coverage to certain resort areas and less to others. SDM attempts to provide the reader with worldwide coverage of those dive resort locations which offer exciting and rewarding dive experiences. However, SKIN DIVER does devote more coverage to those areas which are heavily traveled by its readers. You will find more about the Bahamas, Virgin Islands and Cayman Islands simply because these are by far the most popular vacation destinations among SDM readers.

Some readers ask whether SKIN DIVER travel articles are based on advertising. The answer is no; in fact, it is the other way around. When a SKIN DIVER travel writer visits a dive resort area, it is no secret. Smart advertisers try to tie their advertising into the very same issue which will be publicizing their area. On the other hand, there are just as many instances where SKIN DIVER publishes a travel article without any tie-in advertising whatsoever. This magazine's primary goal is to provide the readers with information which will help them choose and plan their next dive vacation.

Occasionally, we hear from a reader who does not share the enthusiasm or evaluation of a dive resort as reported in SKIN DIVER. This is understandable since all divers do not have identical underwater interests, food preferences, or preferences in hotel accommodations. We have interviewed dive guests staying at the same resort, the same week, who have come to completely opposite conclusions. One diver will be ecstatic about the dive conditions and quite pleased with the services while the other diver finds the reef life boring and the services mediocre. Such conflicting evaluations become a matter of personal opinion, and there is no dive resort in the world which can please everyone all of the time.

No matter how objective and how thorough a SKIN DIVER travel writer attempts to be, his or her report is still a product of personal opinion combined with person-



al experience. Dive resorts simply cannot be evaluated like consumer testing of pop-up toasters. There are far too many variables involved, and most travel reports are based on subjective assessment. Most of SDM's travel writers have attracted a fan club following of readers who have found these writers to have tastes and interests similar to their own.

Once in awhile, we receive an irate letter from a reader who claims the dive resort destination was not as good as SKIN DIVER reported it to be. In the overwhelming majority of these cases, our subsequent investigation revealed the problem was caused by something beyond the control of the resort operator. A bad storm can turn a tropical paradise into hell week; strong winds can prevent the dive boat from visiting the better reefs; an inoperative engine can create delays or crowding aboard the alternate dive vessel; a malfunctioning air compressor can cause frustrating confusion or inconvenience. Sometimes, a change in divemasters or hotel managers can contribute to not so perfect service. Most of these calamities are temporary, but certainly unfortunate to those divers subjected to them. Such events are certainly not intentional on the part of the resort operators, and are totally unforeseen by the writers and editors of SKIN DIVER. Quite frankly, such unforeseen and unfortunate events are one of the great gambles of dive travel. No one can guarantee your airline flight will depart on time, or that the sea will be calm, or that the water will be clear. In the tropics, most everything is changeable at a moment's notice; including the weather, the water, and the dive services.

Each month many thousands of divers embark on overseas dive trips based on what they have read in SKIN DIVER. They place their faith and trust in this magazine because SKIN DIVER has consistently delivered factual, accurate, and comprehensive information about dive resorts all over the world. You, the reader, are the most important consideration in each and every travel article published in this magazine. Bon Voyage! 🐠

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Diver's Calendar

September 20 Vision 360 International Diving Symposium & Film Festival, Buffalo State College (Contact: Dallas Edmiston, PO Box 842, Buffalo, NY 14221)

September 20 Vision 360 U/W Photo Competition (Contact: Ron Smith, PO Box 842, Buffalo, NY 14221)

September 27 NAUI U/W Film Review, John Hancock Hall, Boston, MA, 8 pm (Contact: Fred Calhoun, PO Box 291, Back Bay Annex, Boston, MA 02117)

October 24-25 Dive to Adventure with Jack McKinney, Rockford Divers Association, South Beloit/Holiday Inn, 8 p.m. (Contact: Bill Steinborn, 1385 Randall Dr., Rockford, IL 61108)

November 15 Hawkeye Scuba Club exhibit, banquet, Central YMCA, Cedar Rapids, IA (Contact: Hawkeye Scuba Club, PO Box 8042, Cedar Rapids, IA 52408)

PREGNANT DIVERS

Have you ever dived while pregnant? Are you now diving while pregnant? An obstetrician is gathering data to determine the potential hazards, if any, of diving while pregnant and needs information from pregnant divers. For more information write to Ginny Kendall, 231 Brydon Road, Philadelphia, PA 19151.

AIDE DIVE

The Kitchener-Waterloo and District Underwater Association, Canada, successfully hosted its 6th Annual AIDE dive in February. The AIDE dive, ten hours of continuous ice-diving, provided just short of \$9,000 for charity; far surpassing the goal of \$5,000. Over 80 divers solicited sponsors who pledged to pay them for each hour they remained U/W.

SPORTSWAYS AFFILIATES

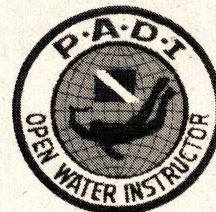
Sportsways announced that Scuba Centro, North Main Avenue, Sierra Bayamon, Bayamon, Puerto Rico 00619, has been appointed the exclusive sales agent for the Puerto Rico area. Scuba Centro will carry a complete stock of repair parts and offer repair service on Sportsways products.

In addition, Underwater World, 91 Bree St., Cape-Town 8001, P.O. Box 10066 — Cape Town 8000, Republic of South Africa, has been appointed exclusive stocking distributor for South Africa. Underwater World will stock Sportsways products and repair parts, and will provide repair service for area divers.

Instructor Training Courses

PADI ITC SCHEDULE

Singapore	July 4-13
Albuquerque, NM	July 5-12
South Caicos, W.I.	July 6-13
Arkadelphia, AR	July 5-13
Honolulu, HI	July 8-August 16
Stella Maris, BAHM	July 12-19
Hopeville, GA	July 14-21
Vancouver, B.C.	August 2-9
Stevens Point, WI	August 9-17
Mountain Home, AR	August 16-23
Scarborough, Ontario	August 24-31
Alberta, CAN	Sept. 1-June '81
New York City, NY	September 5-12
Grand Cayman, BWI	Sept. 26-Oct. 3
Delafield, WI	Sept. 26-Oct 19 (Weekends)
Sydney, AUST	Oct. Weekends
Tokyo, JAPAN	October
Honolulu, HI	Oct. 7-Nov. 15
Anderson, SC	Oct./Nov. Wknds



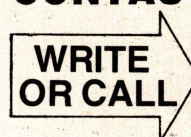
JOIN THE PROFESSIONALS

PADI Instructor Training Courses are also offered monthly at sanctioned Instructor Training Facilities in California, Florida, and Vancouver, Canada. Brochures available upon request.

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- ☐ ITC Info Package - FREE

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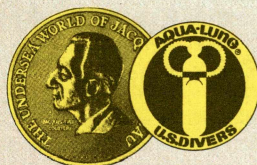
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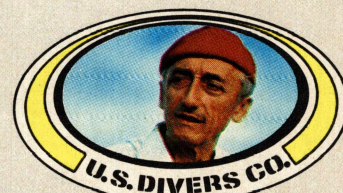
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sport, military and commercial diving equipment.



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It is the playground of billows and tempests, the kingdom of power and awe, embraced by the gull's shriek and the wind's roar. Its whole aspect is suggestive, not of repose and beauty, but of desolation and peril. There it is, and there it will always be; bleak, threatening and pitiless, but forever challenging — the North Sea.

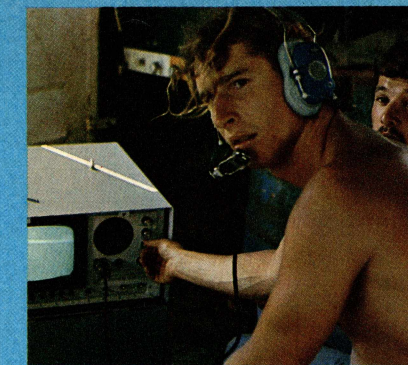
"You gotta be crazy to work in the North Sea," raves Al Daratany, former owner of a commercial dive salvage company, "but commercial divers are looney anyway so maybe the North Sea

is where they belong."

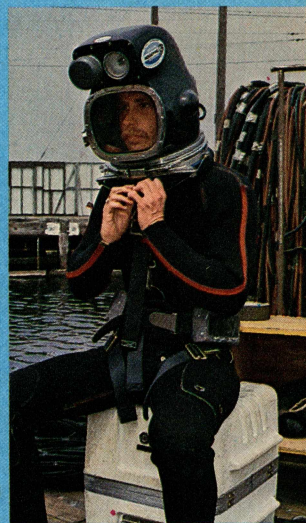
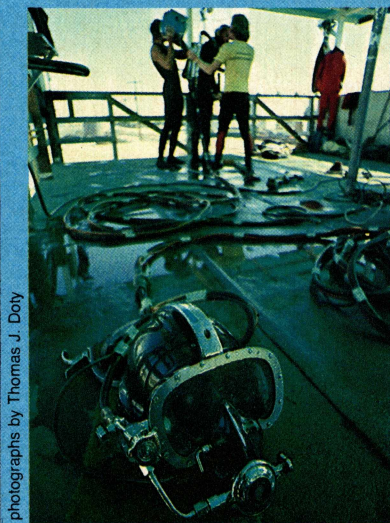
Commercial diving has a reputation for craziness. Daratany calls it a "pre-requisite for the profession." You need to be a little crazy to live this kind of life, whether it's in the North Sea or any one of hundreds of other oil rig locations throughout the world. The oil field diver works offshore and remains there until the job is completed. Today the pipelines are longer, larger, and laid in deeper waters. Underwater structures need constant maintenance, and this usually means many months of work

away from home; obviously not a job for a family man. The divorce rate among commercial divers is one of the highest of any profession.

The work is rough, tiresome and dirty, intensified by 12 hour shifts in and out of waters where six-inch visibility is often considered a clear day. The diver is simply an underwater construction worker with a keen knowledge of task performance and self protection in a subsea environment. A Jack-of-All-Trades, he must be prepared to install, inspect, maintain and repair a variety of



Opposite, a commercial diver welds underwater. This page clockwise, dressing a diver for work. A life-support technician monitors a sat dive. Divers, before and after an oil rig inspection.



photographs by Thomas J. Doty

TRUE TALES Of Commercial Diving

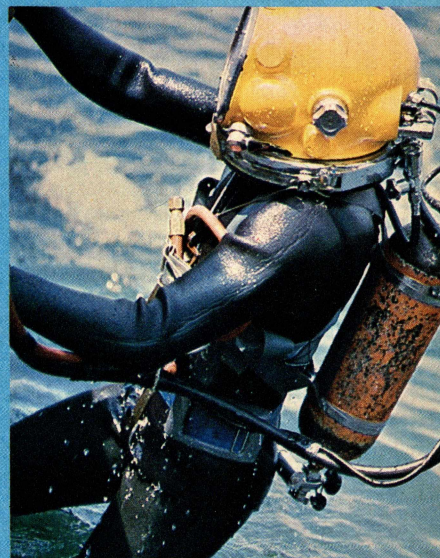
Straight talk from the courageous men who make their living underwater By Ellsworth Boyd

complicated mechanical devices, often by feel when the visibility is zero. He works on ocean bottom well heads, subsea completions, and blowout preventors. He might blast trenches, install multiple-sized flowlines, or replace the damaged section of a platform brace. His tools are sledgehammers, pipe wrenches, cutters, hydraulic jacks, pneumatic grinders and every implement used on topside construction sites.

Most of the experienced commercial divers have some hair-raising tales to

tell; fully documented by scars, bad backs, missing fingers, perforated eardrums and other physical defects which force them ashore. Some retire because they want to settle down and live a normal life. They might even enter the teaching field to keep a hand in diving; Daratany is one of these. An instructor at Commercial Diving Center, Wilmington, California, he logged over 20 years in the profession before entering the teaching field full-time.

"Whatever you do," Daratany cautioned, "don't make us heroes. Re-



photograph by M. Reed

member, what looks dangerous to people in other walks of life is sometimes all in a day's work for a commercial diver."

Daratany once had 30 feet of mud cave in on him while he was jetting trenches for pipe in the pitch black New York harbor. What did he do? "I signaled for another diver to come down and jet me out," he said matter-of-factly.

An efficient topside life-support system is the key to the diver's well-being, especially the tender who supervises the air supply and pays out the lifeline. A

cardinal sin in commercial diving is for the tender to fall asleep or leave his station. This would be like a sentry leaving his post during a war — and war is exactly what Bill Cooper declared on his tender who left to get a cup of coffee.

"I was down over 100 feet in the Indian Ocean, working on an oil rig when my air supply went out," Cooper explained. "I tugged at the lifeline, giving my tender the emergency signal to pull me up, but all I got was more lifeline! I went hand-over-hand up the line and barely made it to the surface. There was nobody at the dive station. My tender had decided to get a cup of coffee!"

"I climbed aboard the platform, ditched my gear, sneaked to the back door of the kitchen and grabbed a cup of coffee. Then I slipped in and sat down next to my tender. It took him a couple of minutes, but when he turned and realized who was sitting next to him he almost had a heart attack! I won't tell you what I said to him — you couldn't print it!"

Sagas from the North Sea are frightening. John Robertson, Training Director at Commercial Diving Center, worked three years for Phillips Petroleum Company in the Ekofisk oil field of the North Sea.

"The North Sea is a hellish place,"

TRUE TALES

Robertson said. "It's not unusual for a diver to work in 18 to 20 foot seas, performing repairs and maintenance on the platform structure. There's a lot of debris to clean off the pipes, broken braces to repair and holes to patch. The water, about 40°F, is the coldest I've ever worked in. Once a construction worker fell overboard and was in the water about five minutes, but 15 minutes later he died of a heart attack."

Robertson was testing a submersible in 250 feet when the tether slackened and looped around a rock on the bottom. Fortunately, he had an efficient topside crew who sent a diver down to free the vehicle.

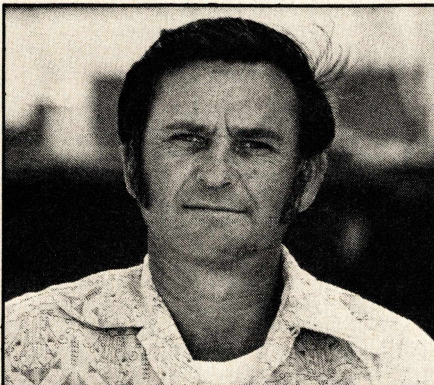
"Submersibles are being tested extensively in the North Sea and other deep water areas," Robertson said, "because drilling is taking place in 4000 feet now. A submersible is good to 3000 feet at the present time."

"Diving bells are going down 1000 feet," he added, "where saturation divers are locked out and working at this fantastic depth. It's a strange feeling — the bell is your home and you swim 25 to 50 feet to the job site. It's a hazardous environment and things can go wrong. You're relieved when you've completed the task,

climbed back in the bell, and the two hatches are closed. But you aren't finished by any means. You still have many hours, usually days, at the holding depth on the surface in the deck decompression chamber.

"There are so many nasty things that can happen in sat diving," Robertson continued. "The bell oscillates with the rise and fall of a construction barge; it can easily become entangled, you can lose your hot water supply which is critical to the comfort of the diver; and sometimes there's a communication loss. How would you like to be hanging in 1000 feet of water with no surface communication? Worst of all is the danger of the main umbilical wire parting.

"Another hazard is rig abandonment," Robertson said. "If you work around the oil fields long enough you'll eventually experience rig abandonment caused by a blowout or severe weather. You can only hope that no divers are down when this happens, because there's no way to bring the bell rapidly to the surface and get the divers off the rig. They would die instantly from massive bends."

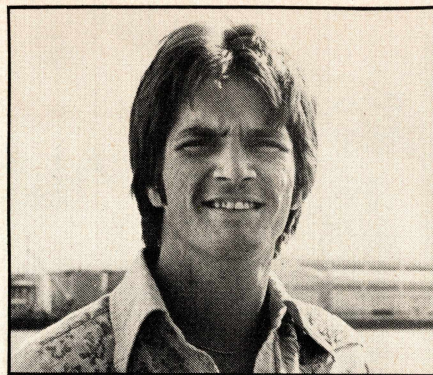


Ray McNew: Sharks gave him a scare . . .

Bell/sat divers have enough on their minds without having to worry about deepsea creatures, but don't tell Dave Stave that. His mind was very concerned with the sea life on a recent 500 foot bell dive from an oil rig off Louisiana; so concerned he aborted the dive.

Stave related his eerie experience: "I've encountered large groupers on several occasions in the past, so I didn't pay much attention to a couple peering into the ports at the dive site. When the hatch opened, I dropped out of the bell and stood on the clump checking out my gear. I started to head toward the structure and stared headlong into a giant grouper's face! I jumped back, looked around, and saw a school of big, fat groupers milling about the bell. The one that I almost kissed was five feet long and weighed close to 1000 pounds. Next to him were two more, at least half his size.

"I pushed the smaller ones and they swam away, but when I pushed the big guy, he didn't budge. I shoved him again, only a little harder, and he moved



Jim Knutson: No old, bold divers . . .

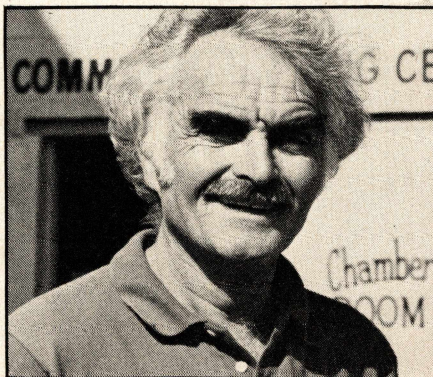
a bit. The third time I gave it to him he spun completely around, made a pass, and snapped at my outstretched arm. If he had grabbed my arm he'd have torn it off.

"I probably set a record for a diver returning to his bell! After informing topside of the situation, I deliberated a couple of minutes and decided to make another try for the work site. Like a soldier cautiously venturing into no-man's-land, I dropped out of the bell and looked around. Satisfied that the coast was clear, I headed for the structure. Suddenly, from out of nowhere they appeared — the big one and his two friends. That was it! I had enough on my mind without playing games with giant groupers. I terminated the dive, re-entered the bell and began decompression."

Jim Knutson, former U.S. Navy first class diver, recounted an old diving adage when he heard about Stave's experience. "There are old divers," he said, "and there are bold divers; but there are no old, bold divers. Stave was smart — taking unnecessary chances won't prolong a diver's career."

Knutson's closest call was in the Navy. "I swam to the stern of a submarine to check its rudder hydraulics," Knutson said. "The area I was ordered to inspect was the size of a small closet, and the opening was so narrow I had to take my scuba tank off and pull it in after me. I completed the job and was ready to leave when suddenly the huge hydraulic pistons started moving. Some idiot aboard the sub decided to do a weekly

Al Nesbitt: A diver with nine lives . . .



photographs by David Gaines

rudder check! The pistons would have crushed me if I hadn't dodged them while they drove up and down. Finally they stopped and I squirmed out."

Knutson had a friend who was drawn halfway into the sea water suction system of a submarine. The diver was performing a hull inspection when somebody turned the system on; he was sucked halfway into the 18 inch opening, but was saved by the buckle on his weightbelt which caught on the lip of the aperture.

If you think working divers have nine lives, you might be right. At least one — Al Nesbitt, a retired 26 year U.S. Navy Master Diver — has used up nine of them, maybe more.

One of his closest calls occurred in San Diego harbor when he was putting a damage control plug in the hull of the aircraft carrier, *USS Princeton*. "I was standing on a hogging line," Nesbitt recalls, "so I could reach the hull. The visibility was zero and the tide was going out fast. I remember being swept off the line twice and the third time I felt something mushy around my legs. It was mud and silt, the ship settled down much faster

cured the air station as well. I couldn't give a hand signal because too much line was paid out for the training maneuver, so I just called up, 'My air's off!' Thirty seconds later it came on and everything was fine.

"Now here's the corker, the next day when we returned to the barge to resume training, the phones didn't work! If that had happened 15 hours sooner I might not be here to tell you about it. There's no way I could have gotten out of the suit. That experience used one of my nine lives."

Most commercial divers have a good shark story and Ray McNew is no exception. "One of my most harrowing experiences," McNew said, "came when another diver and I were laying a trans-oceanic cable off Midway Island. We got caught between the reef and shore, surrounded by a school of sharks milling around us. We were afraid to ascend, and it would have been foolish to try and make it to the beach. We had little choice, other than to back up against the coral heads which afforded restricted protection. The sharks eventually swam out to

bottom line of their profession. They are well paid for the work they perform underwater, where it's hard to fake it. They either do the work and complete the assignment, or turn the job over to somebody else who can get it done. The motivations for commercial divers vary. For some men it's self-satisfaction, belonging to a small, elite group of professional divers whose work always assumes an element of risk. But for most, the incentive is money. An experienced offshore diver can earn \$60,000 to \$70,000 a year, and close to \$100,000 if he's saturation trained.

But divers, like other professionals, must pay their dues. They don't just graduate from a commercial dive school and go right to work. Most of them will spend three to four years as tenders or stand-by divers, earning about five bucks an hour and never getting wet. When they finally make the grade as a diver they can expect to be phased out in their late 30's by company policies that favor younger workers.

There's rapid advancement in the North Sea. That's why so many commer-



John Robertson: The North Sea is hellish . . .

than I anticipated.

"I gave three pulls on my lifeline and nothing happened. The ship came down on my hose at the bilge keel and the tender couldn't feel the tugs. We had no communications system in those days, only line signals, but I had enough hose to work my way aft where the bilge keel flares up. I worked 60 to 70 feet in that direction, which was enough to get me out from under the keel where I could ditch the Desco mask and weightbelt and make a free ascent."

Another time, Nesbitt had his air shut off when he was down 105 feet in a hardhat. "We were at Dalgren Naval Base on the Potomac," he said, "diving everyday for two weeks on a special training mission. One of the training requirements was for the diver in the hardhat, breathing air, to go down to the bottom and walk in a 300 foot circle.

"It was late in the day and I was the last diver down. While the topside crew was straightening up, somebody secured the helium station and without thinking, se-



Bill Cooper: Declared war on his tender . . .

sea, but only after giving us a good scare."

Al Daratany was almost caught in the middle of a shark feeding frenzy. "Another diver and I were working from a tugboat, blowing up a rig that had toppled over in the Gulf of Mexico," Daratany recalls. "The water was clear and we watched throngs of fish schooling around the structure as we were lowered down in lightweight gear. We set 5000 pounds of explosives, then moved off about a mile. After the explosion we waited about 45 minutes for everything to settle and cruised back to the dive site.


"Because of the tug's lingering wake, we couldn't see what was going on below until we jumped in. Boy, talk about a couple of dumbfounded divers! We were almost in the midst of a feeding frenzy with a couple dozen crazy sharks zig-zagging all over the place! We walked on water getting out of there! We returned about eight hours later and a few of them were still there."

Commercial divers are the perennial

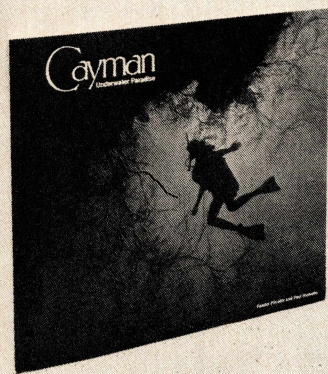


Al Daratany: Commercial divers are crazy . . .

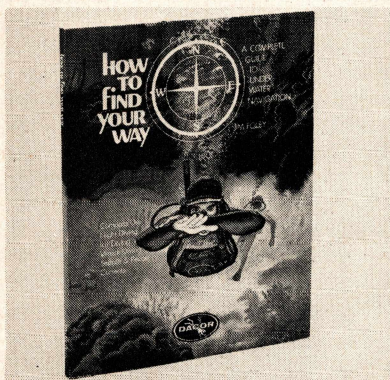
cial diving school grads volunteer to go there; they might advance from tender to diver within a year, sometimes less. But with the tens of thousands of holes being drilled in the sea, most candidates are currently on the ground floor of the deep-sea diving boom. They're working around the clock on rigs in the continental shelf off Brazil; they're blasting through solid rock off the Orkney Islands; repairing underwater blowout preventers in Malaysia and Indonesia; looking out for structural inspection in the Gulf of Alaska; and maintaining rigs in Mexico, the Philippines and the People's Republic of China.

They are modern day pioneers engaged in an underwater Renaissance. Who knows how deep man will be diving and working in another five or ten years? But no matter what the depth, the location, or the task at hand, the commercial diver will be there. His job is dirty, lonely and risky, but he wouldn't have it any other way in a unique profession where there's no place to go but down. 

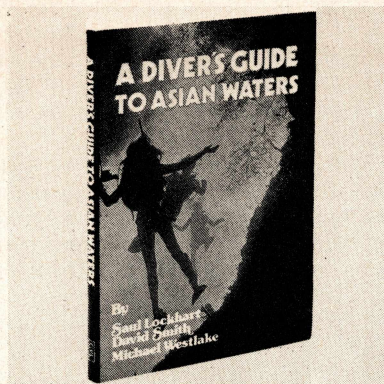
New Books



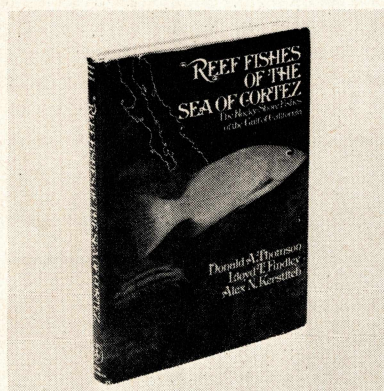
1 Cayman-Underwater Paradise — A breathtakingly beautiful book filled with color photographs of the undersea life and spectacular reefs around the Cayman Islands. A must for divers and lovers of the sea. By Feodor Pitcairn and Paul Humann. \$12.95. From Reef Dwellers Press, Bryn Athyn, Pennsylvania 19009.



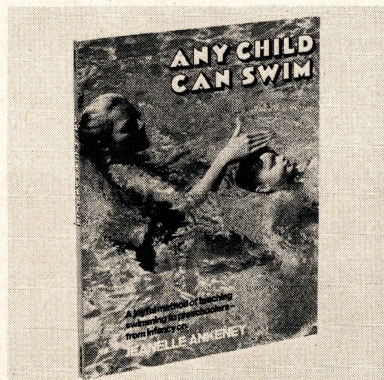
2 How To Find Your Way — A complete guide to underwater navigation by Jim Foley. A comprehensive text on the theory and practical application of direction finding underwater. Covers compass use, night diving, ice diving, wreck diving and more. \$4.95. From Dacor Corp., 161 Northfield Rd., Northfield, IL 60093.



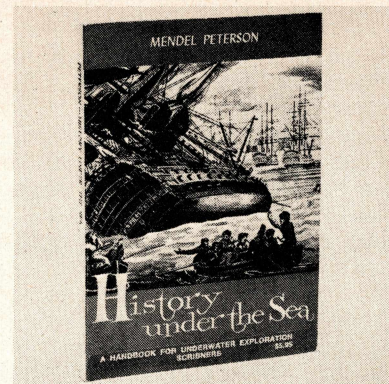
3 A Diver's Guide to Asian Waters — A guide to sport diving facilities and sites, plus onshore and traveling information pertaining to Thailand, Philippines, Malaysia, Singapore, Indonesia, Hong Kong, Taiwan, Guam and Micronesia. \$15. Gareth Powell Ltd., 17 Thomson Rd., 11th Floor, Wanchai, Hong Kong.



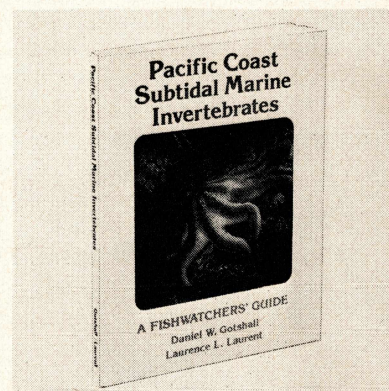
4 Reef Fishes of the Sea of Cortez: the Rocky-Shore Fishes of the Gulf of California. — A reliable field guide for identification of indigenous species. Includes distinguishing features, habits, habitats, and distribution patterns. \$34.50. From John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10016.



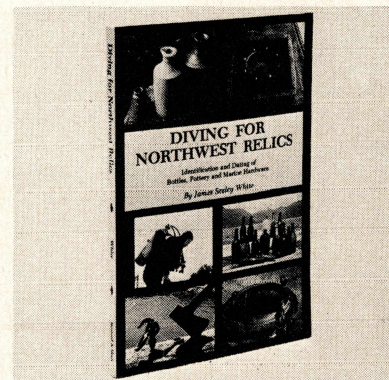
5 Any Child Can Swim — A joyful method of teaching swimming to pre-schoolers — from infancy on. Jeanelle Ankeney's painless method of teaching children how to swim by using experience and conditioning. \$6.95. From Contemporary Books, Inc., 180 N. Michigan Avenue, Chicago, Illinois 60601.



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7 Pacific Coast Subtidal Marine Invertebrates. A Fishwatcher's Guide — By Daniel Gotshall and Laurence Laurent. First ever color photographic guide to subtidal marine invertebrates from the southeastern Alaska coast to central Baja. \$12.50, \$9.50, paperback. From Sea Challengers, 1851 Don Ave., Los Osos, CA:



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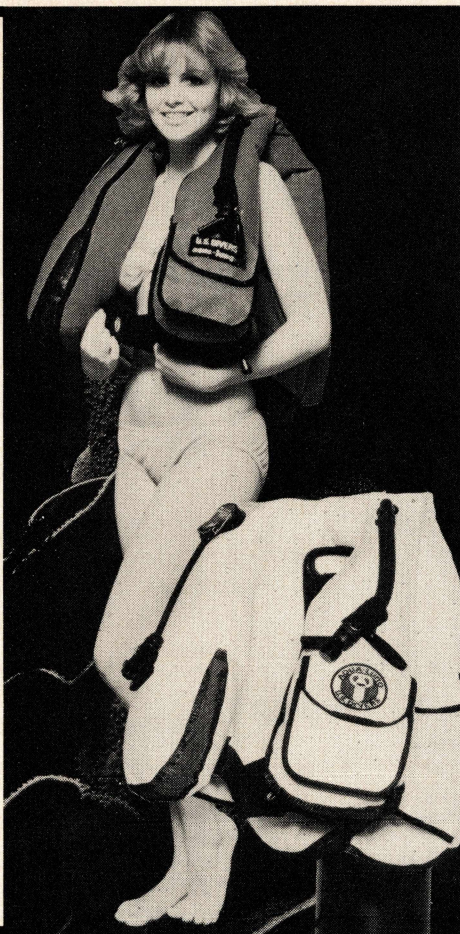
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Rx For Divers

BY CHARLES V. BROWN, M.D.

EYES, EARS AND MISCELLANEOUS

I'm a relative newcomer to diving, says James Wilkes of Dallas, Texas, and I have three questions. 1) My instructor advised against wearing my contact lenses underwater because of a slight chance of injury if an air bubble should form between the lens and the eye. How much of a problem is this? 2) My instructor also advised against taking any medication before diving. Are the mild, commonly used medicines such as Sudafed really dangerous? 3) I wear a mask that has special brackets inside for inserting glasses type lenses. This means three surfaces exposed to fogging. I'm searching for a really effective de-fogger. Saliva hasn't worked well, and neither have several common dive shop potions.

Answer: 1) Hard contact lenses interfere with the flow of the tear film that delivers oxygen and glucose to the eye's front window — the cornea. Eventually the cornea becomes waterlogged (corneal edema) and less transparent, so vision blurs. This is what limits the number of hours a person can wear his lenses on land.

Many divers wear their hard contact lenses underwater and have no problem, but some do experience visual blurring after dives of sufficient depth and time. Hard contact lenses are impermeable to gases and prevent the outward diffusion of nitrogen upon ascent, so bubbles form between lens and cornea. These bubbles further obstruct tear film flow, and so hasten corneal edema. After more radical dives, bubbles may even form within the cornea itself, making matters worse.

For those bothered with post-diving blur, there are several solutions. Having the fit of the lens made looser will permit freer circulation of the tear film. Having the lens fenestrated (one or more holes bored through it) will do the same. Simply dipping one's face into the water with the mask off (lenses in or out) and blinking will often clear the vision because salt water osmotically sucks the edema fluid out of the cornea. Finally, one can switch to soft lenses or to a newer (and costlier) type of hard lens. These are permeable to gas and permit diffusion of oxygen and nitrogen.

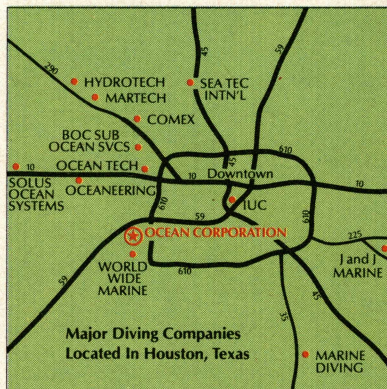
2) Popping pills before diving isn't invariably suicidal, but there are some definite rules. Take nothing without a good reason. Take nothing unless you've tried it topside and found no adverse effects. Even then proceed cautiously, since pressure can change the effects of some

(Continued on Page 18)

Why Houston?

BECAUSE

The Ocean Corporation is located in Houston and more commercial divers are hired in Houston than in any other place in the world. Twelve diving companies are located in Houston including three of the four largest in the U.S. Many others are located in the nearby New Orleans area. The demand for divers is so great in Houston that large locally based diving companies like Ocean Systems, Hydrotech Systems, Martech International and Sea Tech International have hired many of our students for part-time work while they were attending school. Over 90% of our recent graduates went to work for these and other local diving companies when they completed our program. Houston is the place where the action is...the commercial diving, offshore construction and oil industry capital of the world.



BECAUSE

The Ocean Corporation is a commercial diving company, not just a school. Our facilities, equipment and training aids are the best, and our diving systems are as up-to-date as possible... because much of the equipment is used by our diving operations division to perform actual diving contracts in the field. Ocean Corporation has successfully completed many underwater jobs for various industrial clients over the years... including specialized underwater inspections, maintenance and repair work. For example, we did the world's first commercial underwater repair job in a nuclear power plant. And most of our divers have been graduates of our own school.

BECAUSE

The Ocean Corporation is a convenient and exciting place to go to school. Houston is one of the fastest-growing and most dynamic cities anywhere. It is a city of expansion, energy and youth (the average resident's age is in the mid-20's). Houston offers every conceivable kind of entertainment, from sports events, ultra-modern discos and open-air theater to rough-house local rodeos, chili cook-offs and the new Texas-size

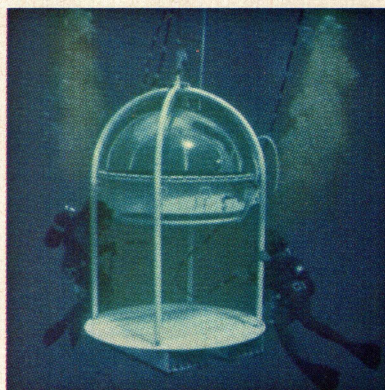


country-western dance clubs. Reasonably priced adult and singles apartments are readily available within walking distance of the school, and fast-food to luxury restaurants are nearby. The semi-tropical climate is wonderful, the sport diving is great and the folks are friendly.

BECAUSE

The Ocean Corporation management and instructor staff have long-term experience in the international offshore oilfield diving business. Retired ex-military divers and sport scuba divers don't run the school...commercial divers do. For example, the President of The Ocean Corporation, Larry

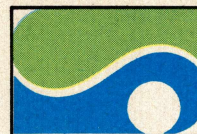
Cushman, was Vice President and Europe/Africa Area Manager for Ocean Systems, Inc. for three years...with responsibility for all North Sea diving and underwater construction operations. He also worked six years as a manager for Oceaneering International, Inc., another of the world's largest commercial diving contractors. Ocean Corporation managers and instructors know today's diving business...first-hand, from recent experience.



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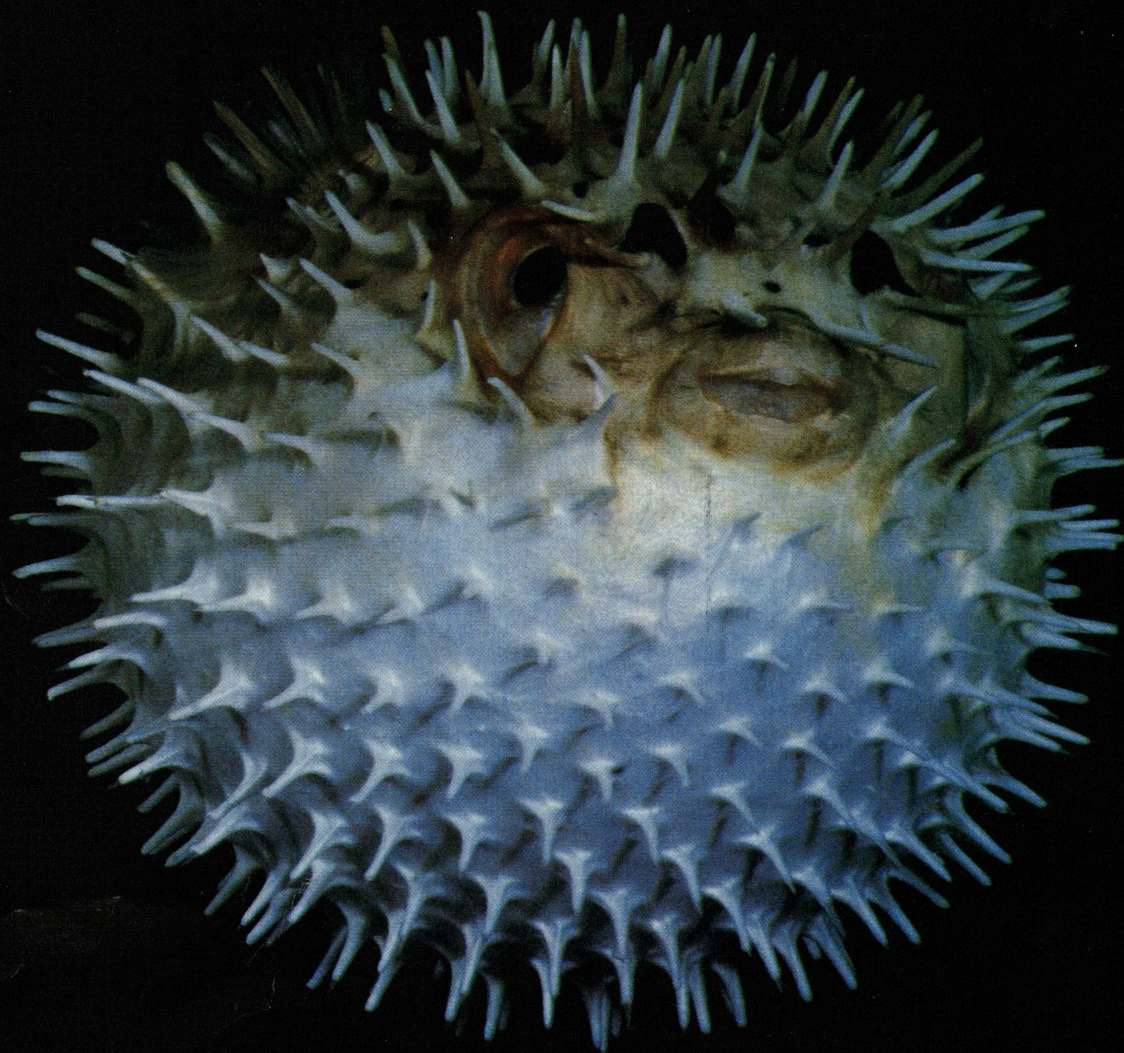
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PUFFERS





Puffers are strange and unique fish which have the ability to grow three times their normal size instantly. These unusual creatures can swell their abdomens to the size of a basketball by swallowing great quantities of seawater, thus preventing potential predators from swallowing them.

The puffer group of fish encompasses a wide variety of species including porcupinefish, balloonfish, burrfish and true puffers. Basically they can be divided into two groups — the spiny puffers and the smooth skin puffers. The fishes pictured are the common Caribbean bal-

loonfish (*Diodon holocanthus*) and were observed in shallow water under a pier.

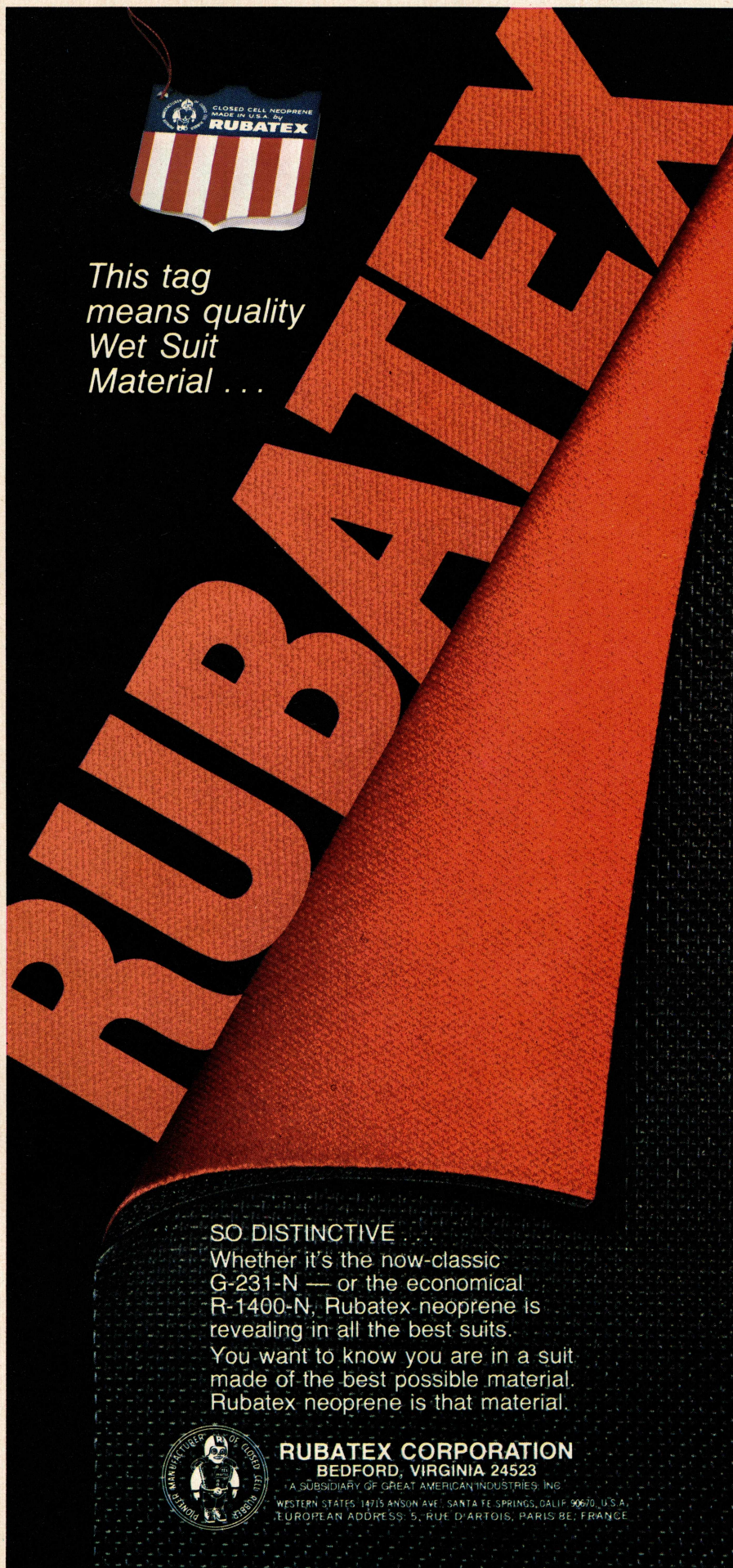
In its normally deflated state, the balloonfish is a relatively streamlined creature resembling other fish on the reef. One would hardly notice the tiny spines folded back against the body. Shy and slow moving, this gentle creature seeks the shelter of a coral head or wreck by day and ventures out only under the cloak of darkness. It has a powerful beaklike jaw which enables it to crush hard shelled mollusks and crustaceans, its main sources of food.

As with the other members of the puffer

fraternity, the balloonfish is able to inflate its body when it senses danger. As the creature rapidly gulps in water, its body begins to expand and the tough outer skin is stretched tight, forcing the sharp spines to stand up straight and protrude outward. Much like the porcupine, this creature becomes a veritable ball of needles. Although clumsy and barely able to navigate, the enlarged prickly body provides a formidable defense. Even if a predator were large enough to ingest an inflated balloonfish, it would find this bundle of spines a tough cookie to swallow! 🐟

Text and Photography by Geri Murphy

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Rx FOR DIVERS

(Continued from Page 14)

drugs. Beware of prescription drugs that add danger to diving. For example, anti-depressants favor heart dysrhythmia and underwater blackout; inderal reduces one's ability to cope with stress; phenothiazine tranquilizers and anti-nauseants spoil one's defense against heat loss — so talk to a diving doctor. Still, certain mild medicines have been used extensively and experience indicates a high degree of safety. Sudafed, in a normal dosage of 30 to 60 mg, is one of these.

3) Fogging has been with us since the beginning. Only hiccoughs and warts have had as many cures proposed. Macho divers won't admit to needing anything more than their own potent spittle. If you've weak saliva or a dry mouth and can't put your finger on some lime juice, onion, seaweed, or fresh-chewed tobacco, you might fall back on a decadent bourgeois substitute. Lemon Fresh Joy is one of the best. Whatever you use will work better if the glass surfaces are kept clean.

Question: Joseph Light of Honolulu has had surgical repair of a detached retina. Dr. David Machtel of Lansing, Michigan has had laser beam treatments for bleeding within an eyeball. Both want to resume diving, but will it jeopardize their sight?

Answer: We'd have to say no and yea. The eye's light-sensitive retina lies against the choroid layer, which provides its nourishment. Detachment occurs when some abnormal stress causes a retinal tear, allowing the jelly-like substance that fills the back of the eyeball to leak in between the retina and choroid, separating them. Bleeding within an eye can have various causes, notably diabetes, arteriosclerosis, and hypertension. Both conditions, of course, are hard on vision.

At issue is whether the pressure changes that go with diving would favor recurrence of either retinal detachment or bleeding. In other words, is the eye subject to barotrauma? Since a change in ambient pressure will be transmitted equally throughout the body, it's not going to alter the pressure relationships among the eye's interior, its blood vessels, and its surroundings. Therefore, detachment or bleeding will not be favored. That's the no part of our answer.

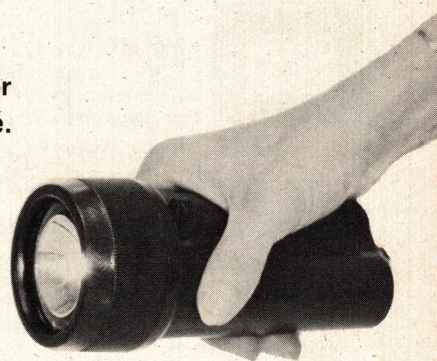
The yes part is that several things incidental to diving can introduce risk. Some think mask squeeze is one. We doubt it, but can't be sure, since the effect of mask squeeze on eyeball shape and pressure has never been studied. The Valsalva maneuver, often used for ear clearing, raises venous and capillary pressure

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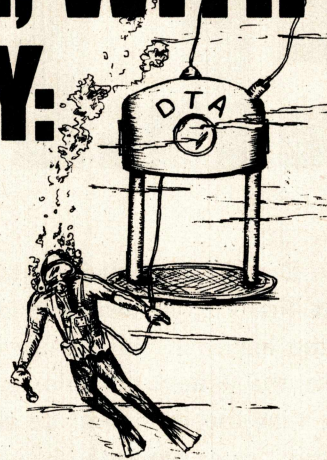
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Rx FOR DIVERS

within the eye. Coughing, choking, gagging, or vomiting underwater would have a similar effect. Still another risk factor would be the sudden acceleration or deceleration of the head that occurs when one leaps into the water from a height or is smitten by angry surf.

A retinal detachment that has been treated and declared healed by an ophthalmologist will tolerate considerable buffeting, and will generally not prevent diving. How much one should curtail his activities to avoid recurrence of ocular hemorrhage is less easily decided. It depends on both the state of the retina and the underlying disease. If abnormal vessels are present or are likely to develop, it's safer to abstain from diving and any other active sport.

Dr. Stuart Wunsh of Clifton, New Jersey, who has graciously volunteered to assist Rx for Divers with matters ocular, suggests that when a decision about diving is not clear cut, the would-be diver ask his doctor to contact the Retina Foundation in Boston for advice.

Question: Ed Bass of Watertown, New York wanted to see what was under the water so he became a diver. But like so many others, he has trouble clearing his ears. He's heard of the Scuba Queen hood, and wonders whether it may be his salvation.

Answer: The Scuba Queen hood delivers air from the regulator second stage to the external ear canal. The advantage of this is to keep the ear dry and so prevent external ear infection (swimmer's ear). It does absolutely nothing for the commonest ear problem, which is squeeze due to eustachian tube insufficiency. However, if a diver whose eustachian tube won't function also has a perforated eardrum, or wants to dive badly enough to have a doctor pierce his eardrum, the Scuba Queen will indeed permit diving. In these cases it not only keeps water from entering the external canal, but equalizes the middle ear through the perforation in the drum.

Question: A Tulsa, Oklahoma diver ruptured his right eardrum last year, and it hasn't healed. Can he dive anyway?

Answer: Yes, There are three ways to go. 1) Ignore the problem, as some commercial types have done in the past. Of course, you may dive dizzy and wind up deaf. 2) Have an operation to repair the defect. This will permit safe diving, but only if the eustachian tube insufficiency (difficulty equalizing) that caused the rupture has been overcome. 3) Wear a Scuba Queen hood. It keeps water out of the external ear canal, and delivers air from the regulator to assure pressure equalization in spite of eustachian insuffi-



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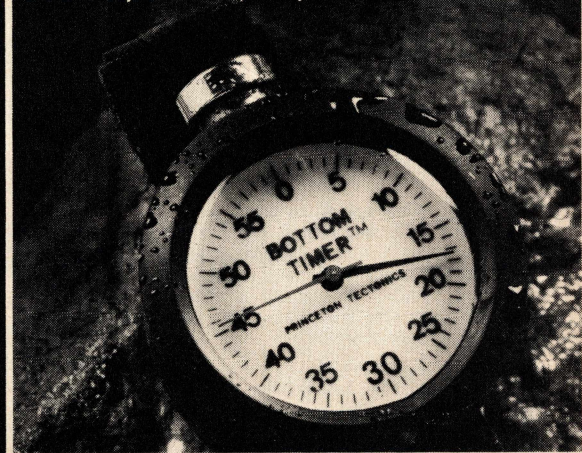
The new PRINCETON TECTONICS watches have been designed with an eye to use, reliability and looks. Pictured here is the TEC 1800 which shares the following features with all the new Princeton Tectonics watches: Scratch resistant mineral crystal/ Quartz movement/ One-way ratchet bezel with decompression stops/ Recessed screw-down crown/ Five year limited warranty/ Stainless steel bracelet with double spring tensioners/ Water resistant to tested depths (TEC 1800 is tested for 1800 ft. - other models vary). Finally, all PRINCETON TECTONICS watches will be repaired and serviced at our own plant - assuring prompt and meticulous technical back-up.



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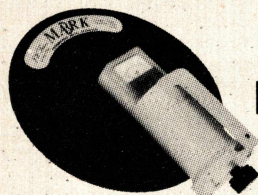
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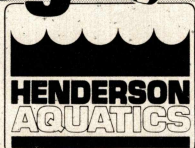
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Rx FOR DIVERS

ciency. For information contact Henderson Aquatics, Buck and Sassafrass Streets, Millville, NJ 08732.

Question: Don Hopkins of Alberta, Canada, says diving gives him a headache. That doesn't stop him, but he would like an explanation and some advice. He dives year-round, mostly at high altitude and in cold water. The pain commences about 15 minutes into a dive. It's always in the frontal sinus area, and may be anything from slight to so intense that his head feels about to explode. Exertion makes it worse, and so does surfacing. It starts to ease about ten minutes after the dive, but traces may linger for up to 24 hours.

To determine whether a tight neck seal might be at fault, he wore his wetsuit around the house for half an hour. No headache. To check whether his underwater breathing was responsible (CO₂ headache), he made a half-hour pool dive. Again no problem. He saw his doctor, who could find nothing wrong.

Answer: Exonerating the neck seal and breathing pattern leaves cold as the prime suspect. Some divers exposed to cold water experience immediate pain above the nose and eyes. Why, we don't know. Delayed pain can be explained by sinus squeeze. Oddly enough, sinus squeeze doesn't always hurt; but when it does the pain can be severe.

Squeeze symptoms are supposed to appear during descent, so the delay seems inconsistent. It isn't really. Nasal membranes congest in response to cold — their blood vessels dilate to warm and moisturize inhaled air. In some unlucky individuals the response is overdone, and sinus openings become blocked. This doesn't happen suddenly. It takes time for the cold to set in and time for the congestion to develop. Hard exertion, of course, increases lung ventilation. Possibly the frigid scuba air, by chilling the airways, increases the reflex activity that brings about nasal congestion and so intensifies it.

But why should sinus blockage that begins at depth cause squeeze, if the diver does not descend further? The answer is that air in the blocked sinus doesn't stay put. Some of it is absorbed into the blood stream, leaving a relative vacuum which is the essence of squeeze. Later, when the diver ascends, falling ambient pressure will ease the squeeze until a depth is reached at which the pressure outside the sinus is the same as inside. With continued ascent a relative over-pressure, called reverse squeeze, develops within the sinus. Air tries to escape, causing pain by distort-

(Continued on Page 28)



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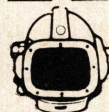
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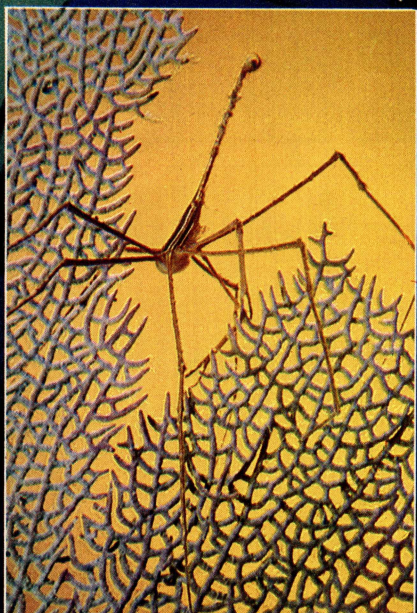
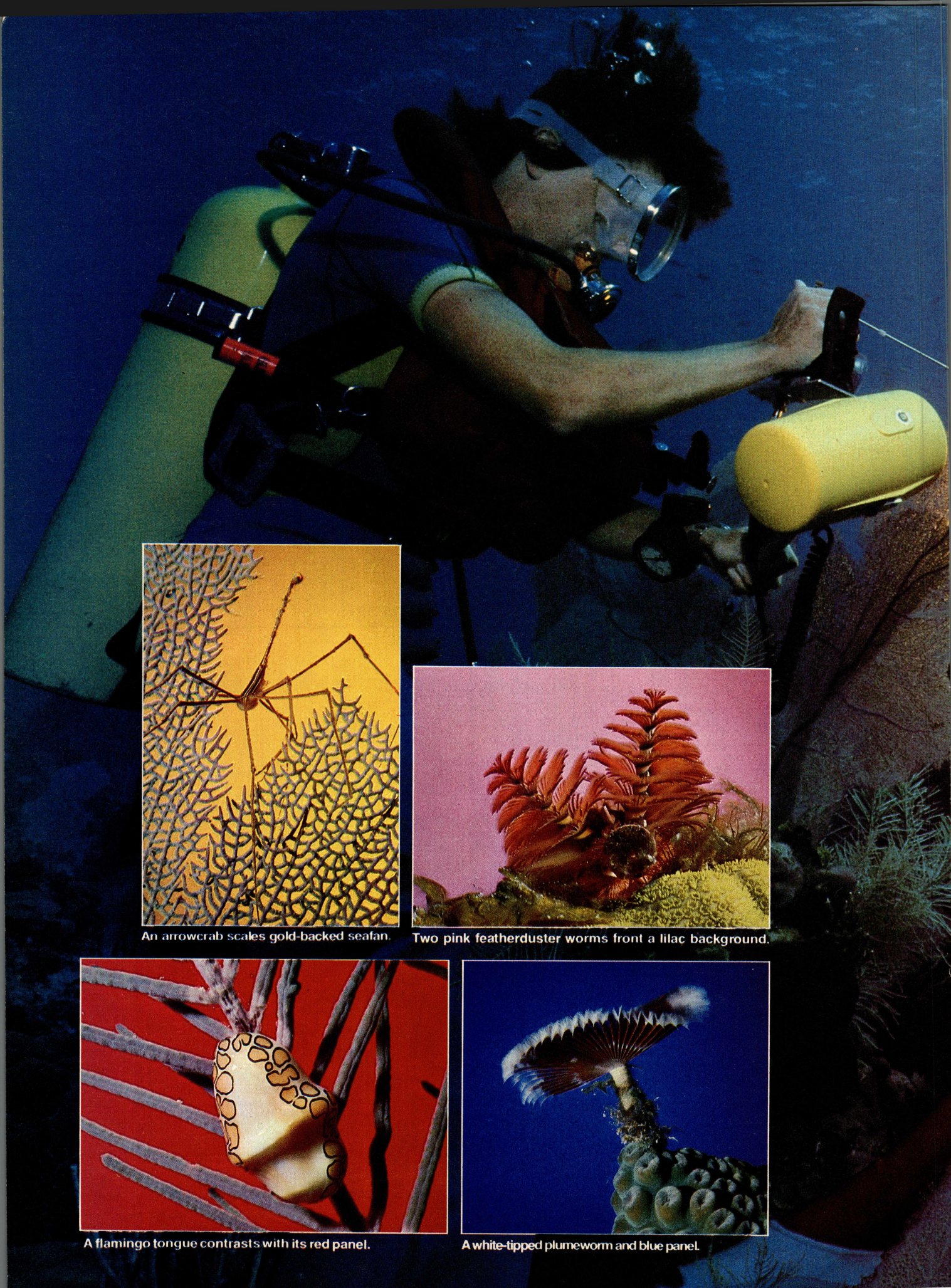
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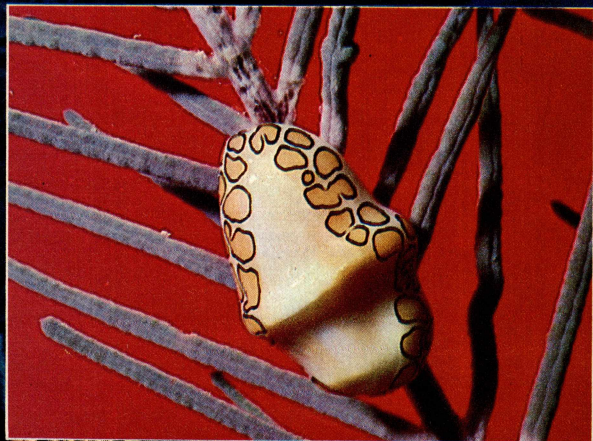
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COLOR PANELS

*Create brilliant backgrounds
for your underwater
close-ups*

Text and Photography
by Jim and Cathy Church

The purpose of this article is to help you create special backgrounds for your underwater close-up subjects. Specifically, we will show you how to produce backgrounds with glowing colors, sunlight backgrounds that emphasize the color cast of the water, and dark backgrounds that accentuate your close-up subjects.

CREATING COLOR BACKGROUNDS

Creating color backgrounds of your own choosing is deceptively simple. All you need are some translucent sheets in different colors, a slave strobe for background lighting, and an assistant to help with the sheets and slave strobe. The idea is to place the sheet behind the subject, and to backlight the subject by aiming the slave strobe back through the sheet toward the subject. In our experiments, we used color Plexiglas panels 3/16 inches thick and 12 inches square, and a YS-35 submersible strobe in the slave mode.

Begin with the following procedures: 1) Choose subjects that are out in the open — away from walls or other obstructions which block the placement of the background sheet. 2) Hold the panel about six to eight inches behind the subject. By keeping the panel just beyond the far limit of the close-up depth of field, any blemishes on it will not be in sharp focus in the finished picture. Holding the background panel too close increases the chances of unwanted shadows or reflections on its surface. 3) Hold the slave strobe about four to six inches away from the panel for extension tube work, and about 8 to 12 inches away if you are using close-up lenses. 4) Hold the master strobe (which provides the exposure for the subject and triggers the slave strobe) at the normal strobe-to-subject distance for the close-up exposure. However, be careful to hold the master strobe at an angle of about 45 degrees or more to the subject and panel. At lesser angles, the reflection of the master strobe's reflector

Cathy Church and Bonnie Charles illustrate the underwater use of color panels for special photographic backgrounds. All you need are some multi-hued translucent sheets, a slave strobe for background lighting, and an assistant.

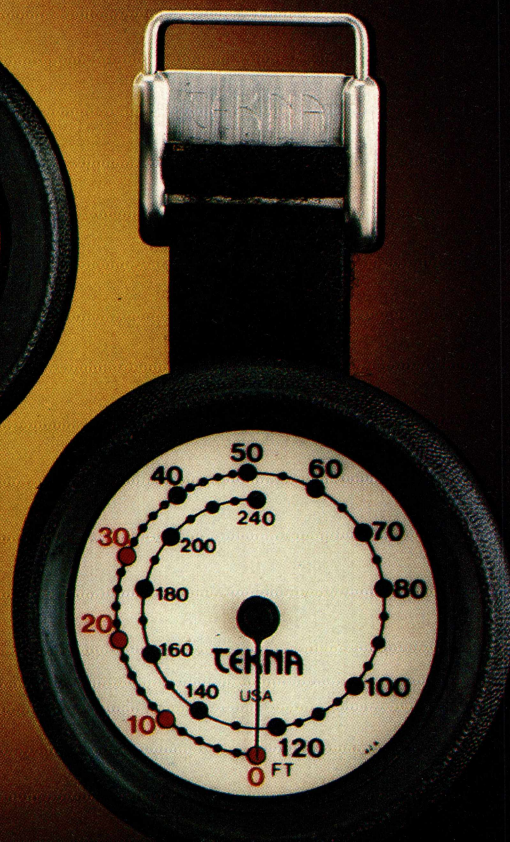
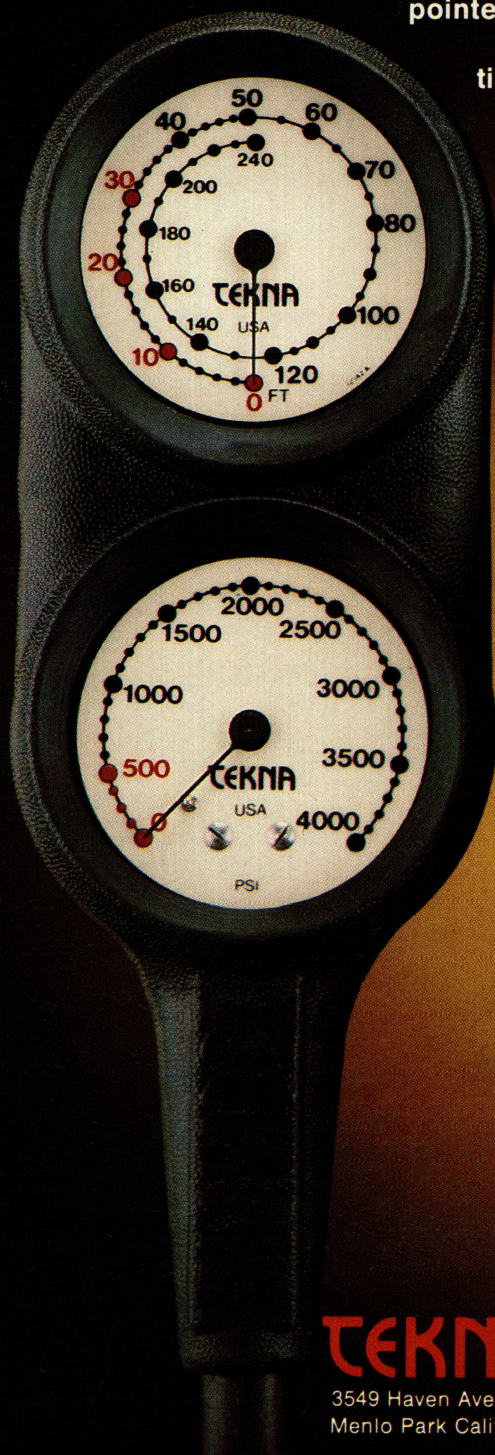
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on the panel may appear in the picture.

When the picture is taken, the burst of light from the slave strobe will cause the panel to glow brightly behind the subject. This produces the bright, colorful background in the picture. This glow of light also adds contrast by backlighting any frilly edges on the subject.

Generally, the smaller the picture area photographed, the easier it is to control the background lighting. With large picture areas, the panel may not be large enough to cover the entire picture area. In some cases, we've had the edges of the panels, as well as the assistant's fingers, show up in the picture. The circular or rectangular glow of light on the panel is also harder to center with larger picture areas. We suggest that you begin with small picture areas — such as 1:2 or 1:3 image/subject ratios with 35mm cameras — and then work up to the larger areas.

The addition of the panel and slave backlighting didn't appear to have affected our exposure settings. We used the same apertures and strobe-to-subject distances that we normally use without the background lighting technique.

CREATING SUNLIGHT BACKGROUNDS

You can use upward camera angles — against midwater or the surface above — to create bright, uncluttered backgrounds which emphasize the color of the water. An upward angle with blue water, for example, can be used to create a rich, blue background in your picture.

The key point is to select subjects that you can get below. With a small crab placed on a seafan, for example, your buddy can gently bend the fan over and hold it in place as you work your upward camera angle. Placing the ball of sun behind the subject can provide an effective background. Backlighting with the sun allows you to outline and accentuate frilly parts of your subjects, such as the stinging cells of a fire coral or the tentacles of a plumeworm. Scattered clouds and a ruffled surface can also create interesting background patterns. If you are working along an underwater wall, drop down just below the edge so you can look upward for tiny subjects silhouetted against the surface above.

To judge how bright the background will be, begin with an exposure meter reading at the desired camera angle. Assuming that your close-up flash exposure is f22, a sunlight exposure reading of f22 indicates that the background will be balanced with the near close-up subject. With an exposure meter reading of f16, the background would be one stop underexposed at the f22 flash exposure. Underexposing by about one stop, however, often produces a richer color and a darker background that doesn't compete with the subject.

If you are using extension tubes with a Nikonos camera, the effective (actual) f numbers will be higher than indicated by

the f stop setting on the Nikonos lens. When the Nikonos lens is set for f22, the aperture is actually about f29 with a 1:3 tube, f33 with a 1:2 tube and f44 with a 1:1 tube. Therefore, you must think in terms of these effective f stops (rather than the f22 set on the lens) when you judge background brightness. With housed cameras and close-focusing lenses, consult the owner's manual for exposure increase at close distances.

BLACK BACKGROUNDS

A solid black background is often best for showcasing bright, colorful subjects. The black background doesn't compete with the colorful subject for the viewer's attention; in fact, it accentuates the subject. A lighter background, on the other hand, could distract from the subject. The viewer's eye could be drawn to bright areas and out-of-focus details.

The first step in darkening the background is to select subjects that can be separated from them — subjects that can be photographed with level or downward camera angles against midwater. A featherduster worm on a mound of brain coral, or a small crab on a kelp stalk, are typical examples. But be careful: Light, reflective areas, such as a buddy's hands or shiny regulator, can show up in your close-up background. Double check the area behind your subject to ensure it is clear.

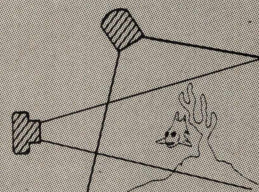
Use the highest possible f number (smallest aperture) possible. This reduces the effect of the sunlight exposure. If you can shoot ASA 64 color slide film at f22, assuming that the sunlight exposure would be about f8, this automatically underexposes any distant background by about three f stops. And if you can expose ASA 25 at f22, assuming the same amount of sunlight, the distant backgrounds will be underexposed by about four stops. Exposing at the higher-numbered apertures, of course, will require a reasonably powerful flashbulb or strobe unit. We would prefer a unit with an underwater guide number of at least 24 with ASA 64 film.

Use a normal-beam strobe (60 degree underwater beam angle or less) for lighting. Extreme side lighting with a single, normal-beam strobe isolates the near subject against the darkened background. A wide-beam strobe (90 degree underwater beam angle or more) spreads light over a much larger area, including the unwanted background. The narrower the beam, the more control you have over the size of the area illuminated.

The suspended particles of sand and other junk in the water can cause problems: The light from your flash strikes the particles, reflects back to the camera lens, and then shows up as bright specks in your dark backgrounds. But don't worry; these specks can usually be darkened by applying Marshall's Transparent Liquid Retouch Colors to the emulsion side of the slide with a fine brush. ➤

BEAM ANGLE AND BACKGROUND CONTROL

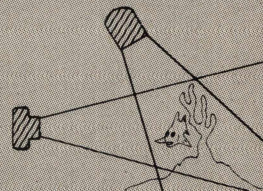
A wide-beam strobe spreads light over a larger area than you normally photograph with a standard or close-up lens. This is advantageous because the wide beam will illuminate the subject even if you aim the strobe incorrectly.



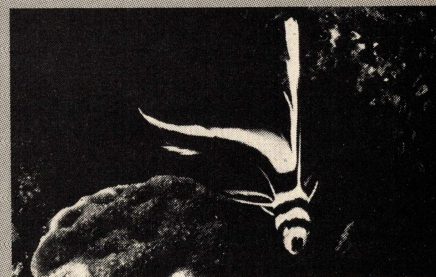
The disadvantage of the wide-beam strobe, however, is that it is more difficult to control the illuminated areas. With close-ups, the background will usually be illuminated as well as your close-up subject. You could, however, construct a neoprene hood that fits over the front of the strobe and restricts the beam angle.



A normal-beam strobe spreads light over a smaller area. Thus, you must aim the strobe accurately if you wish to illuminate only selected parts of the picture area.

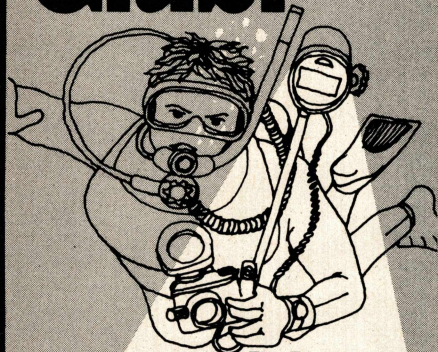


By aiming a normal-beam strobe at an angle to the near close-up subject, you can often avoid illuminating unwanted background details. This tends to darken the background, and thus accentuates the near subject.



A normal-beam strobe may take more skill to use effectively, but it offers greater potential for creative lighting and background control for underwater close-up photography than a wide-beam strobe.

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The Toshiba Toshmarine TM-1 strobe light was specifically designed and engineered for under water photography. It's lightweight, rugged, compact and comes complete with adjustable arm and an 8 foot coiled cord with universal adapter. The perfect mate for any Nikons and other underwater cameras and gear. The dome, 4.6" long and 3.8" in diameter, weighs a mere 2.4 lbs. the flashtube and reflector are recessed so as to withstand accidental impact. It's tested to a depth of 396 feet! Powered by four AA size alkaline penlight batteries that provide up to 250 flashes and recycles in 5 to 7 seconds.

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Rx FOR DIVERS

(Continued from Page 22)

ing the membrane about the blocked opening.

Unfortunately, your problem may be harder to overcome than to explain. Dress as warmly as possible for your dives, and try a decongestant pill or long-acting spray. If that doesn't do it, try using WABA (Warm Air Breathing Apparatus). And if you can find one, add a moisturizing device to prevent evaporative heat loss.

Question: Laurel Grandle of Marysville, Tennessee buddied up with her sister for a brief 25 foot dive in a freshwater Florida river. The temperature was pleasant, and they wore only T-shirts. After surfacing she felt an intense itching-burning pain, "Like fire coral," on her chest. There was no rash. It lasted about two hours, fading gradually. Her sister was unaffected. She'd like to know the cause.

Answer: So would we. Severe burning pain suggests a barrage of nematocysts from a coelenterate such as fire coral or a jellyfish. But the pain they produce is immediate, and there's a very red rash. And they couldn't penetrate your T-shirt — they'd have to get under it. Furthermore, freshwater coelenterates are uncommon, and we know of no attacks on divers. If any reader can come up with an explanation, we'd be grateful.

Question: Dr. Benjamin Kendall, a Philadelphia obstetrician and diver, suspects that diving holds more danger for the pregnant female than is generally recognized. He's looking for information.

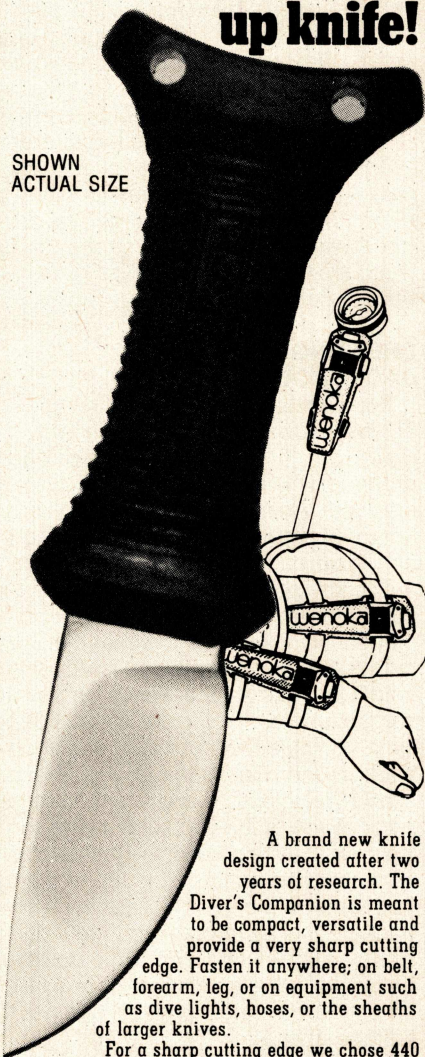
Answer: PADI conducted a seminar on the subject November 12, 1977. For a copy of the proceedings write them at 2064 Bush St., Anaheim, CA 92706. The May, 1978 Medifacts column reviewed the information available to date. Margie Bolton, a Florida nurse, mailed questionnaires to a lot of women and found evidence that deep diving increased the chance of having a deformed baby. Other surveys were initiated by Eleanor Crown of the University of Michigan, and by Cheri Boone and Susan Bangasser of NAUI. A small book entitled *Women Underwater*, by Jeanne Sleeper and Susan Bangasser, is available for \$4.95 from NAUI, Box 630, Colton, CA 92324.

The consequences of diving while pregnant have recently been under study by several senior hyperbaric scientists, including Dr. Fife at the University of Texas and Dr. Lanphier at the University of Wisconsin. Their findings appear in the most complete and authoritative work on the subject. It's *The Effects of Diving on Pregnancy*, Fife, W. P., editor, and may be ordered from the Undersea Medical Society, 9650 Rockville, Pike, Bethesda, MD 20014 for only \$3.

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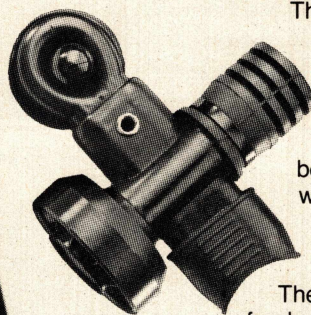
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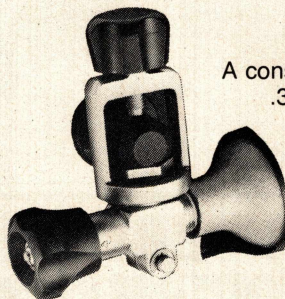
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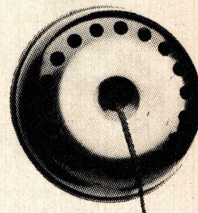
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LONG ISLAND DIVERS

A new organization of dive clubs in the Long Island area of New York State has been formed to promote the interests of the diving community. The organization has been named Long Island Divers Association.

At this time, membership is open to dive clubs in the Nassau-Suffolk County area, individuals, dive shops, and anyone else interested in promoting the use of Long Island waters for dive activities. The association is headquartered at the Diver's Way Dive Shop, 596 Sunrise Highway, Bay Shore, NY 11706.

OUTSTANDING SALES AWARDS

Klein Associates, Inc., of Salem, New Hampshire, announced the winners of the Outstanding Sales Agent Awards for 1979. The Domestic Award was presented to Jon B. Jolly, Inc., of Seattle, Washington. John covers the Northwest United States, Western Canada, and Alaska.

J. Bornhoft Industriegeerate GmbH, of Kiel, Germany, was presented the International Outstanding Sales Award for 1979. Jöe started his business only three years ago. Awards and bonus checks were recently presented to both companies.

PADI AND CMAS SEVER RELATIONS

Due to irreconcilable differences, a complete disjunction has occurred between PADI and CMAS, an agency that establishes international equivalency for diver certifications.

Shortly after CMAS invited PADI to become a member of the CMAS Technical Committee and PADI accepted, it became apparent that there were strong philosophical differences between the two organizations. Attempts to negotiate these differences were hampered because of the distance between PADI Headquarters in California and the CMAS office in Paris. Language differences compounded the problems.

DANNY'S DIVE SHOP

Danny's Dive Shop will celebrate its three year anniversary in August. William "Rocky" Colavito has been one of the driving forces behind the success of the Long Island based dive shop. A graduate of McArthur Military Academy in New Jersey and Cortlandt State College, Rocky is involved in every area of operation. Managing the repair center, organizing party boat dives with students, teaching and having daily contact with the local dive community have made Danny's a success.

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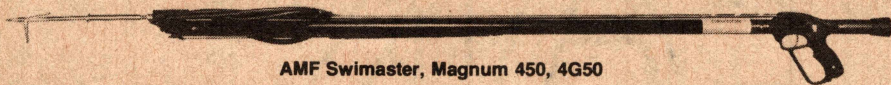
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SPEAR GUN ROUNDUP



PERTINENT POINTS ON CHOOSING THE
NEWEST RUBBER POWERED GUNS
TEXT AND PHOTOGRAPHY BY HOWARD HALL

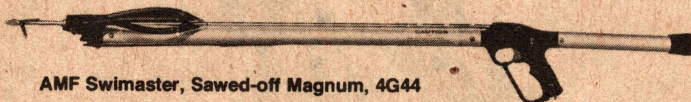
SPEARGUN ROUNDUP



AMF Swimaster, Magnum 450, 4G50



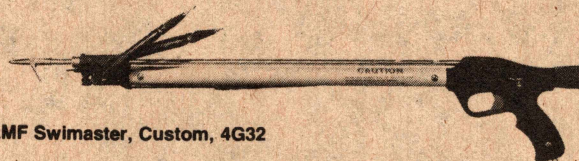
AMF Swimaster, Magnum Spearfishgun, 4G46



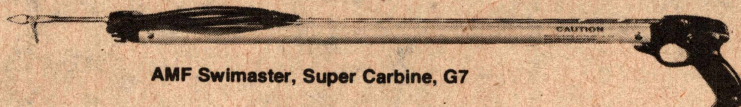
AMF Swimaster, Sawed-off Magnum, 4G44



AMF Swimaster, Mini Magnum, 4G49



AMF Swimaster, Custom, 4G32



AMF Swimaster, Super Carbine, G7



AMF Swimaster, Carbine, G6

I halted my ascent at 40 feet. Although my lungs would not tolerate the lack of breathing much longer, the sound I was hearing caused me to hesitate and extend the length of my dive a few seconds. My six foot long speargun was pointing straight up toward the surface to minimize water resistance when I resumed my ascent. My eyes had adjusted to the dim, golden twilight of the kelp forest and I desperately scanned the area for the source of the sound. It was a loud croaking sound; one that brings an adrenalin rush to a California spearfisherman. The sound of one of the most elusive fish in the world and in Southern California, and certainly the most prized. It was the sound that the white seabass makes.

The sound became louder, and though I could not discern the direction of its source, I knew it was very close. In fact, it sounded like it was right on top of me. But, I couldn't wait any longer. The duration of my dive was approaching the limits of safety. I looked up toward the surface to resume my ascent and froze. It was passing right above my head not eight feet from the end of my gun! It was a white and certainly the largest white I had ever seen. It looked five feet long and maybe even six, with golden light reflecting off its silver scales. I took quick aim with an unsteady hand and fired. There was a powerful metallic sound and a sudden recoil as the three rubber slings launched the stainless steel shaft with nearly 1000 pounds of thrust. I noticed a sudden movement of the fish's tail and heard a deep varoom as the fish sped away.

But the spear shaft was faster than the fish and it struck the animal just above the pectoral fin. In the next instant I reached for the line release of the gun's reel with my middle finger. The 100 feet of line on the reel would allow the fish to run without breaking the line or tearing the spearhead out. But I fumbled, and before I could release the brake on the reel, the fish had broken the 180 pound monofilament leader line in two places, leaving a two foot section dangling in front of me.

I reached the surface, reviewing every curse word I had ever heard and inventing a few more. Spearfishing a fish and losing it is worse than not seeing anything worth shooting. I was disgusted with myself and very disappointed. It would have easily been the largest white seabass I had ever speared. It was certainly 50 pounds, could easily have been 70, and in fact, might have been close to 100. That would have been a world's record! I couldn't believe it got away.

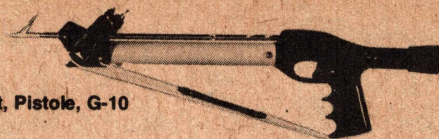
There are many methods of spearfishing. The sport ranges anywhere from free diving for the elusive and powerful white seabass, to scuba diving for surf perch. And although the ethics of some

spearfishermen are deplorable, the sport remains noble and environmentally harmless for most enthusiasts. In recent years I have replaced the speargun with an underwater camera to satisfy my hunting instincts, but I still have two of the weapons and regularly enjoy fresh fish. But without question, many of the most cherished memories of my dive career are of spearfishing. Climbing out of the surf on the rocks near La Jolla Cove in early evening, forced to give up because it was too dark to see. More often than not, I'd be out for hours and return empty-handed. It was never necessary to spear a lot of fish. In the year that I speared and lost that 150 pound white seabass, I shot less than a dozen fish. But each was a prize; my friends and I were always interested in quality more than quantity. There were never more than three or four species of fish we were looking for, and only reasonable sizes of these.

Spearfishermen have been criticized in the past for having no regard for the health of the environment. In spearfishing contests, a contestant's skill was determined by the tonnage of random fish he could pile up on the beach. It wasn't important, in most cases, what kind of fish you shot or how large it was. Five hundred pounds of butterflyfish could score as highly as a 500 pound tuna. This rather obscene spectacle earned spearfishing a bad name during a time of awakening environmental awareness. As a result, spearfishing was discouraged, and some equipment manufacturers dropped spearguns from their product lines.

But there has been a resurgence in the sport of spearfishing. Manufacturers are reporting record sales of spearguns and accessories. Fortunately, the spearfishing contests are relics of the past, and the new generation of spearfishermen is interested in the quality of the game they spear as well as the impact of their actions upon the environment. Of course, there still remains considerable variation in spearfishing ethics, but the guy who spears a 200 pound territorial grouper is no longer heralded as a hero among his peers. Too many people, spearfishermen and non-spearfishermen alike, are aware of how long it will take the environment to replace such a magnificent creature on that section of reef (if it ever can in this day and age).

The new environmentally aware spearfisherman is familiar with the fish he stalks, understands the impact of removing members of that species' population, shoots only reasonably sized fish, and kills no more than he can consume. In the year that I shot and lost that 200 pound white seabass, I shot less than a dozen fish. Two were white seabass and the rest were yellowtail. All were large fish from healthy migratory populations.



Aqua-Craft, Pistol, G-10



Aqua-Craft, Bonito, G-11



Aqua-Craft, Barracuda, G-12



Aqua-Craft, Manta, G-16



Aqua-Craft, Shark, G-18

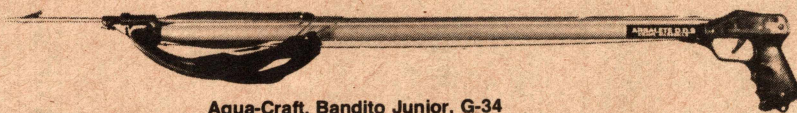


Aqua-Craft, Pacific, G-19

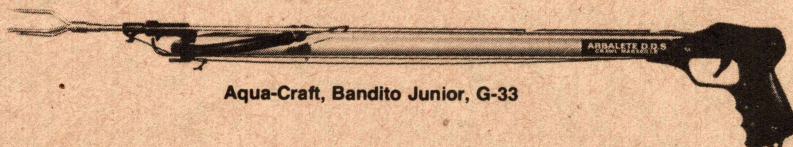


Aqua-Craft, Baja, G-20

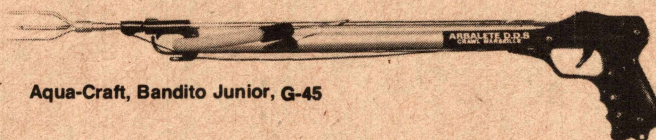
SPEARGUN ROUNDUP



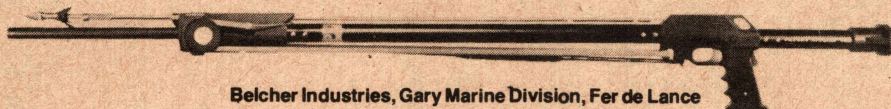
Aqua-Craft, Bandito Junior, G-34



Aqua-Craft, Bandito Junior, G-33



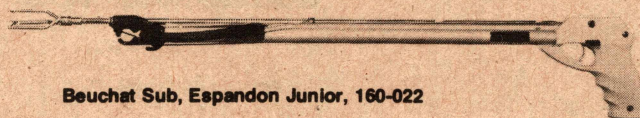
Aqua-Craft, Bandito Junior, G-45



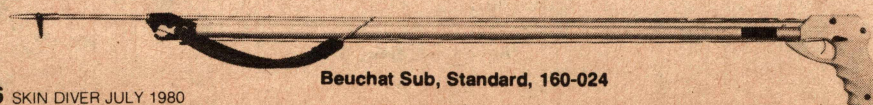
Belcher Industries, Gary Marine Division, Fer de Lance



Beuchat Sub, Espandon Deluxe Magnum, 200-013



Beuchat Sub, Espandon Junior, 160-022



Beuchat Sub, Standard, 160-024

If you are a beginner, this understanding of the animals you should hunt in your area, and the environmental consequences of hunting, might be a little hard to come by. But it is essential that you seek it out — whether from your dive instructor, local clubs, or from experienced, local spearfishermen. This understanding of the game in your area is not only important for environmental reasons, but is also the main consideration in choosing the weapon to hunt that game with.

There are well over 100 spearguns on the market today. This article is confined to rubber powered guns, but even with this restriction I once had over 60 spearguns lying on my living room floor. Most are remarkably similar in design (with a few notable exceptions) except for one important factor — size; especially the length and weight of the spear shaft. To a large extent, the size of the spear shaft will determine the size and strength of the fish your gun is capable of landing.

SHAFT SIZE

Spearguns are designed around the length and weight of the shaft. The critical measurement is the distance from the muzzle to the shaft on which the slings hook. This, and to a lesser extent the size and length of the rubber slings, will determine how much thrust is delivered to the shaft when fired. It will also determine the impact the shaft has on the target. The longer the shaft, the more acceleration it will accumulate, and the more speed and range. Shaft length and diameter will determine shaft speed, range, and impact (given a constant rubber force). Of course, you could accelerate a smaller shaft with as much energy as a longer one by putting stronger slings on the smaller gun; but this only works within practical limits. If you put a sling on a four foot gun creating a 100 pound force, the shaft will be launched with the 100 pound force over a four foot length, or 400 foot pounds of thrust (100 pounds X four feet), (assuming the rubber pull is constant over the entire four foot length, which it is not). To produce the same thrust on a one foot gun, you would need a 400 pound sling and an 800 pound gorilla to cock the gun.

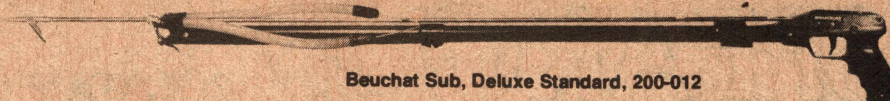
Now you might wonder why you would want a speargun that develops nearly a 1000 pounds of thrust (as the really large ones do) if you are not going to be hunting a great white shark. But all of that thrust manifests itself in one very important factor — range. A speargun with an 18 inch shaft can produce an effective range of about four feet. A speargun with a shaft length of five feet can be effective at 16 feet! Of course, at the very limit of a gun's range you might not have enough impact left to bury the spearhead deep enough to hold the fish. Impact will be determined by the thrust, weight of the shaft, and proximity of the target. To hold

a good sized yellowtail, you might have to be within ten feet of the fish with a gun that has a range of 15. With an 18 inch gun you would have to be within inches of the yellowtail. You may have to hunt a long time to find a yellowtail that stupid. When I shot and lost that 250 pound white seabass, I needed to be within ten feet of the end of my gun to hold the fish with a gun that could shoot nearly 20 feet.

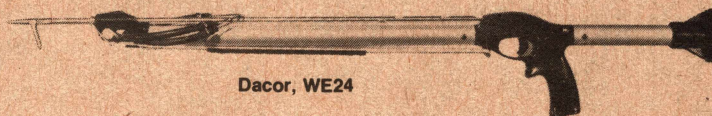
All of these facts about thrust, impact, shaft speed, and range might be a little confusing, but unfortunately there is no data to quantify the qualities for each gun. The primary reason for this is that the testing would be too expensive and time consuming for the manufacturers. And the results would be highly variable, depending on the length and diameter of the slings, the rubber's age, and how long the slings have been cocked. However, it is quite obvious that a six foot long speargun will be more powerful and have a greater range than a two foot long gun. It is also obvious that the larger gun is intended for larger fish. You can get some rough idea of the range of a speargun by looking at the length of the shaft. Most high quality guns capable of handling maximum powered slings will have a range of approximately four times the length of the shaft (from the end of the gun to the tip of the spearhead). Most guns of this sort will have a leader length of about this length.

The choice of shaft diameter does not have such obvious manifestations. Speargun shafts are available in three sizes — 1/4, 5/16, and 3/8 inches (or very similar metric sizes). The 1/4 size is generally used for very small guns with shaft lengths of two feet or less. The barrel strength and mechanism design of this small gun cannot support the stress of heavy or multiple slings, and therefore cannot produce enough thrust to propel a larger shaft fast enough to do any good. Although the 1/4 inch shaft requires less thrust to generate speed, what is gained with the added speed is lost in impact. This type of gun is certainly not designed for the serious spearfisherman. There are three advantages to the small 1/4 inch guns: They are very inexpensive, are fun to shoot, and they give the fish a sporting chance.

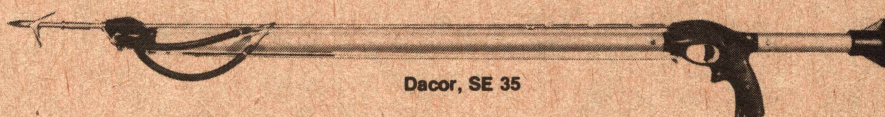
The remaining two shaft diameters are used in the professional guns, and there is some controversy as to which is best. The 5/16 inch shaft is faster, but the 3/8 inch shaft arrives with greater impact and is harder to bend. Speed allows you to hit a fast moving fish, like a tuna or white seabass, but high impact allows you to bury the shaft deep enough to hold one of these large fish. So you are left facing a trade-off situation, speed versus impact, and your choice must depend upon the animal you intend to hunt and your spearfishing skills. Of course, you can modify the characteristics of your gun by increasing the strength of the rubber you put on the gun. Thus you can increase



Beuchat Sub, Deluxe Standard, 200-012



Dacor, WE24



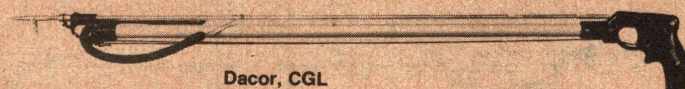
Dacor, SE 35



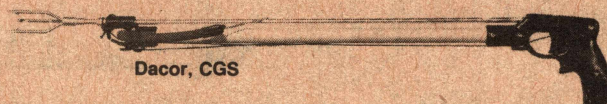
Dacor, ME43



Dacor, LE47

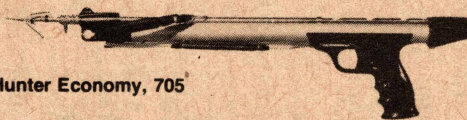


Dacor, CGL

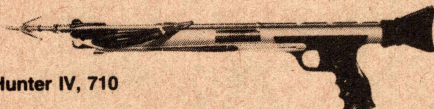


Dacor, CGS

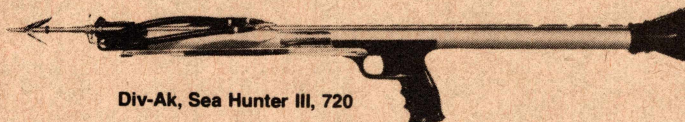
SPEAR GUN ROUNDUP



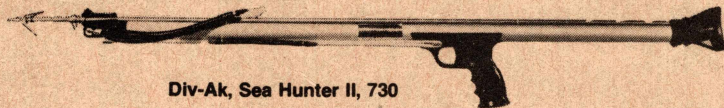
Div-Ak, Sea Hunter Economy, 705



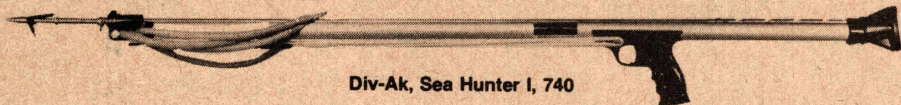
Div-Ak, Sea Hunter IV, 710



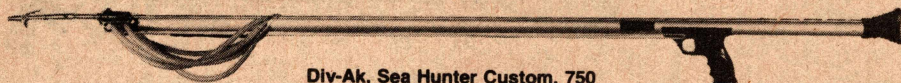
Div-Ak, Sea Hunter III, 720



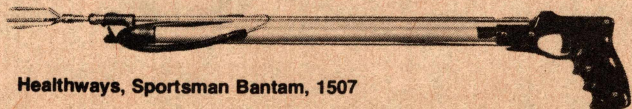
Div-Ak, Sea Hunter II, 730



Div-Ak, Sea Hunter I, 740



Div-Ak, Sea Hunter Custom, 750



Healthways, Sportsman Bantam, 1507

the speed of a 3/8 inch shaft and the impact of a 5/16 inch shaft, but there are problems with these modifications. Increasing the sling strength too much will cause conditions such as loading up, pre-firing, and shaft oscillations and bowing. Any of these could render your super powered gun useless.

LOADING UP AND PRE-FIRING

The triggering device inside the spear-gun is generally a one-piece or two-piece mechanism and in either case, the critical part is the sear. This stainless steel sear catches the small groove on the underside of the spear shaft when the shaft is inserted into the mechanism. With the amount of rubber recommended by the manufacturer, the mechanism will fire smoothly during repeated use, but eventually the shaft and the sear will wear. There is tremendous force concentrated on the small stainless steel surfaces of the shaft and sear, and over a period of time one of two things will happen; either the surfaces will develop a burr or they will become rounded. Either of these can cause a malfunction. By increasing the strength of the slings you will greatly increase the wear on these surfaces, and a gun that might have functioned well over many hundreds of firings could develop a malfunction after only a few dozen.

If a burr is created on the sear or shaft, you will develop a malfunction called "loading up." In this case, the cocked gun will not fire regardless of how hard you pull the trigger, or will only fire with extreme trigger pressure. If this has never happened to you, you cannot imagine how frustrating it is. You are out spearfishing for the world record yellow-tail and you have been free diving for hours. Perhaps you have seen a few small yellows but have passed them up because your missile launcher is so difficult to load. Then when you have just about decided to give up because you are getting so cold you can't hold your snorkel in your mouth, you see your world record fish. He swims up to you without fear, presenting an unprecedented close shot. You can't believe how dumb this giant is. You switch off the safety, take careful aim, and squeeze the trigger. Nothing happens! You squeeze the trigger harder and still nothing. The fish continues to circle and even comes closer. You desperately check the safety and squeeze again with all your strength and again nothing happens! You can't believe this is happening to you and you want to scream. The fish slowly swims away and you swear you can hear him laughing. When you reach the surface you remove your snorkel and scream. You remove your knife and throw it at a seagull. You hear the seagull laugh. You put your snorkel back in your mouth, switch off the safety and squeeze the trigger with both hands in a frenzied, rage filled effort, causing you to bite

through the mouthpiece tabs on your snorkel! The gun fires. The shaft hits a rock ruining the spearhead. The leader line becomes tangled in the kelp. You swallow the mouthpiece tabs.

On the other hand, the surfaces of the shaft and/or sear may become rounded. In this case, the malfunction your gun may develop is the pre-fire. If you load a malfunctioning gun, with the safety off, then the gun will pre-fire just as you load the last sling. With the gun butt placed against your hip, the recoil will feel like you have been given a low punch by Sugar Ray Leonard. After you recover and the wave of nausea subsides, you will probably decide that the gun pre-fired because you had loaded the shaft incorrectly. Meanwhile, a large school of large yellowtail show up and begin circling you. You decide to load the gun again. You discover that the pre-fire hurts twice as bad the second time. If the gun is loaded with the safety on (as it should be), then it will pre-fire when the safety is switched off instead of when the trigger is pulled.

Although the consequences of loading up can be extremely frustrating, the consequences of a pre-fire can be disastrous. Unfortunately, neither malfunction is uncommon. To guard against a serious accident caused by a pre-fire you should always assume that a loaded gun with the safety on or off, is going to fire at any time. Use the safety but never trust it, and switch it to the off position only after taking aim and just before firing.

SHAFT OSCILLATION AND BOWING

Another consequence of using extra strength slings on your gun is oscillations in the shaft as the shaft leaves the barrel. When the gun is fired, the back end of the shaft wants to accelerate faster than the spearhead. Therefore, the shaft may oscillate up and down as it leaves the barrel, causing inaccurate trajectory. Under especially powerful loads, the shaft may actually bow as it is fired. This will cause the shaft to go as much as 20 degrees high or low of the target. The thinner and longer the shaft, the more likely it is to bow. For this reason, the really large guns all use the larger 3/8 inch shaft.

It is rather obvious that tampering with the sling strength of your gun can cause unfortunate results. But many serious spearfishermen insist on customizing their guns. If you do increase the sling strength on your gun, do so with moderation and care. Then be prepared for the consequences. If you have to sacrifice accuracy and mechanism malfunction for power, it may be an unreasonable trade-off.

SLINGS

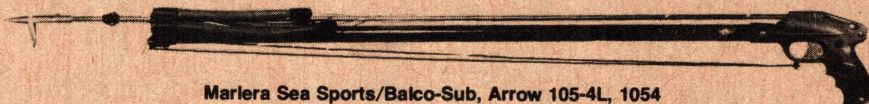
There are two factors which influence the thrust delivered by a sling to a given shaft length. One is the diameter of the rubber; the other is the length of the sling



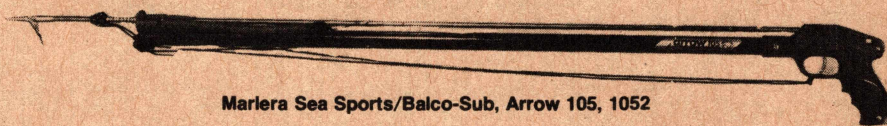
Marlera Sea Sports/Balco-Sub, Thunder 105, 1105



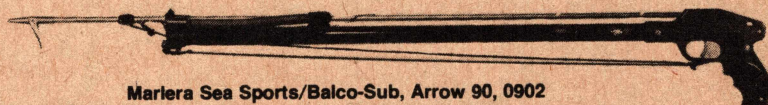
Marlera Sea Sports/Balco-Sub, Thunder 90, 1090



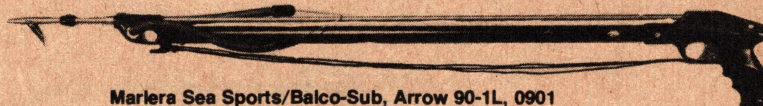
Marlera Sea Sports/Balco-Sub, Arrow 105-4L, 1054



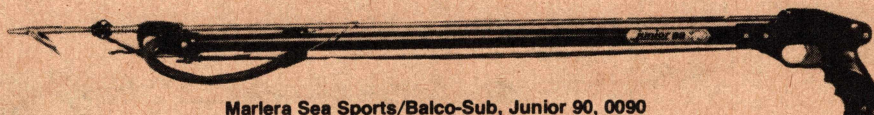
Marlera Sea Sports/Balco-Sub, Arrow 105, 1052



Marlera Sea Sports/Balco-Sub, Arrow 90, 0902

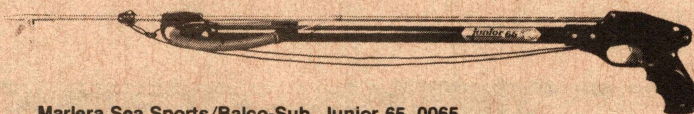


Marlera Sea Sports/Balco-Sub, Arrow 90-1L, 0901

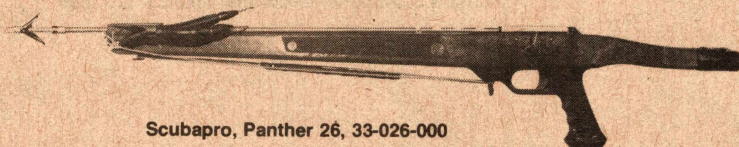


Marlera Sea Sports/Balco-Sub, Junior 90, 0090

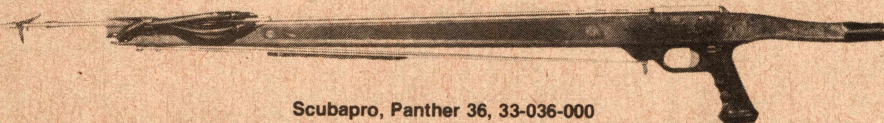
SPEARGUN ROUNDUP



Marlera Sea Sports/Balco-Sub, Junior 65, 0065



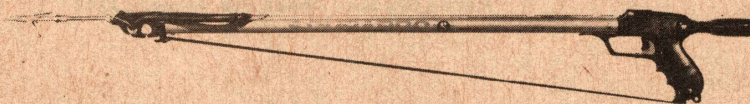
Scubapro, Panther 26, 33-026-000



Scubapro, Panther 36, 33-036-000



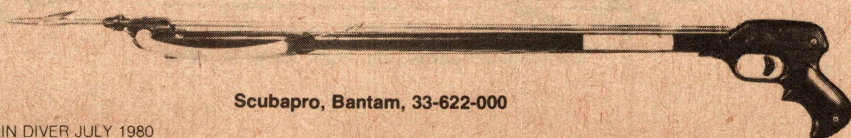
Scubapro, Lightweight 43, 33-643-000



Scubapro, Lightweight 35, 33-635-000



Scubapro, Lightweight 25, 33-625-000



Scubapro, Bantam, 33-622-000

(which is measured by the length of the rubber tubing used to make the sling). Rubber tubing comes in a variety of diameters and wall thicknesses. Most speargun rubber is thick-walled tubing having only a tiny hole in the center, while thin-walled tubing is generally reserved for pole spears. Speargun rubber is available in various sizes from $\frac{3}{8}$ inch to $\frac{5}{8}$ inch in diameter, and in two colors: Amber and black. Amber is the natural color of the rubber, while black tubing has lampblack added for ozone resistance. Both colors perform equally well.

Rubber strength fades with time. The longer the gun is cocked, the more strength the rubber loses. And the tighter the rubber is stretched, the more power will be lost with time. After an hour, standard sized slings will lose nearly 25 percent of their strength, and if the slings are stretched tighter than normal, the power loss can be much higher. Since you want your gun to shoot with consistent accuracy, over-shortening the slings can be counter-productive. It is better to have long, large diameter slings rather than short, small diameter slings to develop the same thrust. Most professional quality guns come with two or three one-half inch diameter slings, with a length matched to the shaft length.

Like most rubbers, speargun rubber is subject to reversion. This process shows up first where the sling is clamped to the wire wishbone. There are several things you can do to increase the life of your slings. You can spray silicone grease all over them, but though this may be good for the rubber, it makes the sling nearly impossible to load. The best way to care for your slings is to remove them from the gun when they are not being used and keep them in a tightly closed plastic bag. This will keep atmospheric ozone away from the rubber and greatly increase its life.

SAFETIES

The best place for the safety release on a gun is right next to your thumb or index finger when your hand is on the grip and your finger on the trigger. In this way, the safety can be released at the very last moment prior to firing the gun, and you always know whether the safety is on or off. Older models of guns that I have used in the past have had safeties located in a variety of impractical positions. You could never remember whether the safety was on or off, and since releasing it was a two handed operation, there was no way to check just before pulling the trigger. The result — a recurring attempt to pull off a shot with the safety on. I was surprised to see that all the guns I inspected had thumb or index finger released safeties. But I might have missed a few models, so check for this feature before choosing a gun.

SHOCK ABSORBERS

Most professional quality guns have a

shock absorber. This device is a short length of rubber tubing placed between the gun muzzle and the end of the leader. The idea is for the shock absorber to buffer the impact as the shaft reaches the end of its leader line. But I have found that in most cases, when the shaft hits the end of its leader line it has lost most of its impact anyway, and the shock absorber become relatively unimportant. Where the shock absorber is important is in loading and stringing the gun leader. When you string the last loop of leader from the muzzle to the line release, you then stretch the shock absorber to make the final loop fit and this keeps the leader line on tight — a very handy function. If, however, the gun you buy does not have a shock absorber, you will probably be repeatedly frustrated by your leader line falling off the line release hook unless you buy a shock absorber and put it on your gun.

BUTT STOCKS

The butt stock is an extension of the barrel behind the hand grip and trigger mechanism. It has two important functions: One, it makes loading the slings considerably easier by putting the shaft slots (where the slings hook onto the shaft) out in front of you where you can see them. It can be difficult, especially with large guns, to bring the slings all the way back to your hip to attach to the shaft. The butt stock considerably reduces this effort. Second: The butt stock is very useful in aiming the gun. Although there are undoubtedly many ways of firing a large gun, the most popular is to extend the gun out in front of you as far as possible with your trigger hand, and then steady the gun for aiming by holding the butt stock with the other hand.

Two of the guns I inspected had shaft release mechanisms at the end of the butt stock rather than just in front of the handgrip. With this design you don't have the advantage of having the shaft loading slots out in front of you where you can easily see them when loading the slings. Manufacturers claim there are other advantages: By having the handgrip set forward of the end of the shaft, you reduce the length of the gun out in front of you and yet still have long shaft power. This reduction in the length of gun barrel forward of the grip increases the maneuverability of the weapon. However, I'm not convinced that this advantage outweighs the loading disadvantage.

LINE RELEASES

Most top quality spearguns have mechanical line release mechanisms, but not all. The mechanical line release is a metal hook around which the leader is looped. When the gun is fired, the line release mechanism is triggered and the hook falls forward — allowing the leader line to freely follow the shaft. Some guns,

SPEARHEADS

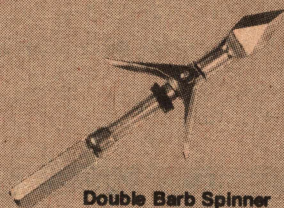
The spearhead that you choose is just as important as the gun size. The simplest of the spearguns is the three prong gig. This head has no moving parts — just fixed barbs on the three prongs. Generally, this head is found on the smaller beginner's guns. Next is the sin-

gle barbed head; in this case the barb is a wing-like device which folds up next to the shaft when the shaft is fired, but flares out when the fish tries to pull free. The most popular spearhead design is the double barb head. This is the same as the single barb head except that it has two barbs which flare in opposite directions. Some of these may have detachable tips which allow the tip of the spearhead to be replaced if the original has been damaged. Some double barbed heads have independently spinning barbs — a useful feature. Often when a fish is speared, it will spin on the shaft. If the fish is powerful enough, or the spearhead is not securely fastened to the shaft, the fish will spin it off. Not only do you lose the fish, but you also lose the

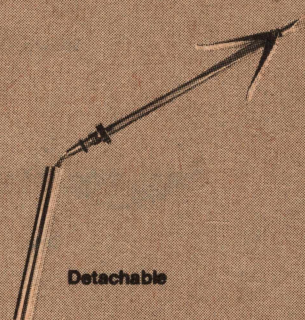
difficult to approach, then the cutting point is the best choice; but if the animal you're looking for lives among rocks, the rock tip is far more practical. Many double barbed heads have a small ring at the base of the head for holding the barbs down. This is an extremely important feature, but is often misunderstood. The ring should not be attached when the shaft is fired. If it is, the



Single Barb



Double Barb Spinner



Detachable

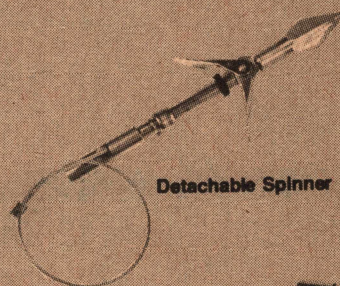
ring will not free the barbs as it passes through the fish. Although this may be hard to believe, I have seen it happen more than once. The true function of the ring is for removing the fish from the shaft. You simply push the shaft all the way through, place the barbs under the ring and pull the shaft out. Without the ring, it may be necessary to unscrew the head from the shaft which will be especially difficult if the spearhead has been attached with pliers.

When really large fish are speared they may fight so hard that one of two things can happen. One: The fish may enlarge the hole in its body so much that the shaft pulls free. Two: The spear shaft becomes

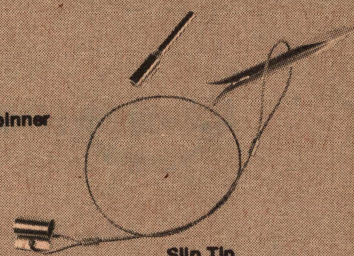
bent into a useless pretzel. Both of these problems can be minimized by the use of a detachable spearhead. This kind of head fits loosely to the end of the shaft but remains attached with a line or wire. When the fish begins to fight and run, the head comes off and the shaft falls free, but remains attached to the head by the line or wire. In this way the torque produced by the struggling fish seldom bends the shaft or throws the spearhead. It is a real shame to lose a fish because the spearhead was inadequate. In most cases, for spearguns with 36 inch shafts or larger, the detachable spearhead is the best choice.



Double Barb



Detachable Spinner



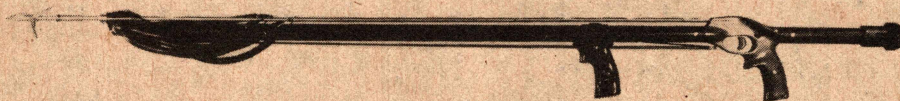
Slip Tip

spearhead. The spinning barbs greatly minimize the problem, but whether you have this kind of head or not, you should securely fasten the spearhead to the shaft with a pair of pliers.

If the spearhead has replaceable tips, there may even be a variety of these to choose from. There are cutting tips which have two or three sharp edges. These are especially good for maximum penetration at long range since the tips are extremely sharp. But the cutting tips are also easily damaged, and if you like to shoot rocks for target practice, as a lot of beginners seem to like to do, this tip probably won't last very long. Also available are rock tips which are rounded to a smoother point. If the fish you intend to hunt is a free swimming variety which is

bent into a useless pretzel. Both of these problems can be minimized by the use of a detachable spearhead. This kind of head fits loosely to the end of the shaft but remains attached with a line or wire. When the fish begins to fight and run, the head comes off and the shaft falls free, but remains attached to the head by the line or wire. In this way the torque produced by the struggling fish seldom bends the shaft or throws the spearhead. It is a real shame to lose a fish because the spearhead was inadequate. In most cases, for spearguns with 36 inch shafts or larger, the detachable spearhead is the best choice.

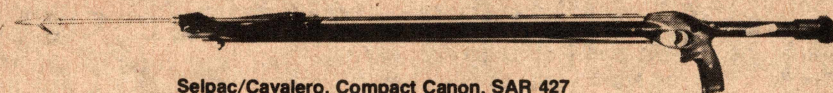
SPEARGUN ROUNDUP



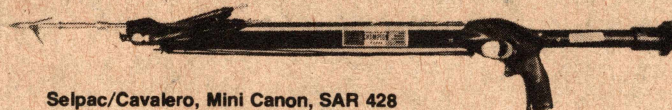
Selpac/Cavalero, Super Canon Deluxe, SAR 430



Selpac/Cavalero, Maxi Canon, SAR 429



Selpac/Cavalero, Compact Canon, SAR 427



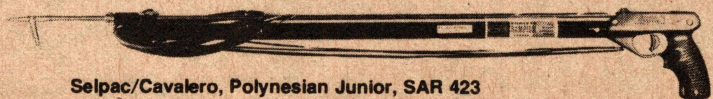
Selpac/Cavalero, Mini Canon, SAR 428



Selpac/Cavalero, Polynesian Deluxe, SAR 421



Selpac/Cavalero, Polynesian Standard, SAR 422



Selpac/Cavalero, Polynesian Junior, SAR 423

however, have non-mechanical releases which are nothing more than a rubber loop, or a plastic slot, in which the leader line can be lodged but will pull free when the shaft is fired. The non-mechanical release can often be frustrating because it is impossible to keep the leader strung tightly to the gun. This allows the leader to catch on objects and constantly fall off.

BIG GAME ACCESSORIES

The mistake I made when I shot and lost that 300 pound white seabass was not having my finger on the brake release of the reel when I fired. Some really large fish will run so hard that unless you have made a spinal shot, your leader line will break, the gun will be pulled from your hand, or the spearhead will be ripped free. If you decide you are going after these monsters; yellowtail, white seabass, black seabass, tuna, or something on that order, you should have a spear-fishing reel. This device is available from several manufacturers and attaches just forward of the trigger mechanism. When you fire at a large fish, you simultaneously release the brake on the reel giving the fish an extra 100 feet of line to run with. Generally, you will not need the entire 100 feet of line. The fish will begin to circle and tire once it is 30 or 40 feet away, or just beyond visibility. Then you can wait until the fish has expired before you reel it in.

Occasionally, with exceptionally large fish, the reel is not adequate and you should have a break-away. The break-away is an inflatable float (perhaps a small life vest) which is attached to the end of the reel line or to the gun. When the reel line runs out, you inflate the buoy and let it go. Later, when the fish has expired, you recover the buoy and the fish.

SAFETY

Spearguns are dangerous. I even know of one fellow who speared himself. This illustrates that you can't be too careful with these weapons. He was standing in waist-deep water in La Jolla Cove. He placed the butt of the small gun on his hip and began to pull the slings back. What happened next was both painful and embarrassing. The butt of the gun slipped off his hip and the gun was thrust behind him. The rubber slings were stretched again as the gun was propelled backward, and then the gun was thrust forward into my friend's backside. He certainly looked uncomfortable as he walked up the beach to the lifeguard tower with a three prong gig and spear shaft embedded in his rear end.

Unfortunately, other speargun accidents have proved more serious than this. For this reason, there are some safety practices that should be followed. One: Spearguns should never be fired out of water. Since air is far less dense than water, the action of the shaft will be considerably different above water. If

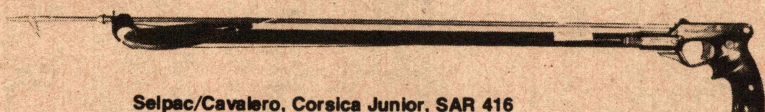
RUBBER POWERED SPEARGUN REFERENCE CHART

MANUFACTURER MODEL	CATALOG NUMBER	SHAFT LENGTH/ DIAMETER (INCHES)	NUMBER OF RUBBERS	LINE RELEASE	LEADER LENGTH (FEET)	TYPE SPEAR- HEAD	PRICE	SPECIAL FEATURES
AMF SWIMMASTER								
Magnum 450	4G50	54/3/8	3	Mech.	16½	double barb detachable	\$160.00	The Magnum 450 has extremely efficient, very large double barbs which detach on short heavy cable. Hard holding head.
Magnum Spearfish	4G46	46½/3/8	3	Mech.	14	double barb detachable	124.00	
Sawed-off Magnum	4G44	35/3/8	2	Mech.	10	double barb spinner	106.00	
Mini Magnum	4G49	41/5/16	2	Mech.	13	double barb spinner	104.00	
Custom	4G32	23/5/16	2	Mech.	7	single barb	82.00	
Super Carbine	G7	33/1/4	2	Non-mech.	5	double barb	68.00	
Carbine	G6	22/1/4	1	Non-mech.	3	single barb	59.00	The Magnum Spearfish gun has hard holding spearhead.
AQUA-CRAFT								
Pistole	G-10	14/5/16	2	Mech.	5	single barb	\$47.95	The Pistole has extremely short strong slings and heavy shaft for its size.
Bonito	G-11	26/5/16	2	Mech.	8½	single barb	54.95	
Barracuda	G-12	42/5/16	2	Mech.	13½	single barb	64.95	
Manta	G-16	42/3/8	3	Mech.	13½	double barb	79.95	The Pacific has an efficient hard holding spearhead.
Shark	G-18	48/3/8	3	Mech.	16	double barb	85.00	
Pacific	G-19	26/5/16	2	Mech.	8½	double barb spinning de- tachable	79.95	
Baja	G-20	42/3/8	3	Mech.	13½	4" sliptip wire leader	99.95	The Baja is rigged for big fish around coral and rocks. Most efficient tip available. Rigged in stainless steel cable leader.
Bandito Junior	G-45	19/1/4	1	Non-mech.	3½	3 prong gig	22.95	
Bandito Junior	G-33	26/1/4	1	Non-mech.	4½	3 prong gig	26.95	
Bandito Junior	G-34	35/1/4	2	Non-mech.	5½	single barb	32.00	
BELCHER INDUSTRIES/ GARY MARINE DIVISION								
Fer de Lance		36/3/8	1 special design	Mech.	9½	double barb spinner	\$160.00	The only true deviation from the standard rubber powered spear gun design. The single sling operates on a pulley system greatly increasing thrust. Double safety system. Point protector.
BEUCHAT SUB								
Espadon Deluxe	200-012	40/7 mm	1	Non-mech.	10½	single barb	\$83.50	Beuchat Sub guns feature ad- justable trigger mechanisms.
Espadon Deluxe Magnum	200-013	44/7 mm	1	Non-mech.	11½	double barb	87.00	
Stapdard	160-024	43/7 mm	1	Non-mech.	6	single barb	47.00	
Espadon Junior	160-022	25/7 mm	1	Non-mech.	3½	3 prong gig	41.00	
DACOR CORP.								
WE24		24/3/8	2	Mech.	7	single barb	\$80.00	Dacor guns float without shafts.
SE 35		35/3/8	2	Mech.	10½	double barb	83.00	
ME43		43/3/8	2	Mech.	13	double barb	90.00	
LE47		47/3/8	3	Mech.	14½	double barb	100.00	
CGL		32/1/4	1	Non-mech.	5	single barb	34.00	
CGS		23/1/4	1	Non-mech.	3½	3 prong gig	33.00	
DIV-AK								
Sea Hunter Economy	705	24/3/8	2	Mech.	6½	none	\$53.00	The Sea Hunter Custom has the longest shaft length of guns surveyed by Skin Diver: 6 feet!
Sea Hunter IV	710	24/3/8	2	Mech.	6½	none	64.00	
Sea Hunter III	720	35/3/8	2	Mech.	6½	double barb	78.00	
Sea Hunter II	730	44/3/8	2	Mech.	12	double barb	89.00	
Sea Hunter I	740	54/3/8	3	Mech.	17	double barb	100.00	
Sea Hunter Custom	750	72/3/8	3	Mech.	17	double barb detachable	122.00	
HEALTHWAYS								
Sportsman Bantam	1507	23/1/4	1	Non-mech.	3½	3 prong gig	\$26.20	
MARLERA SEA SPORTS/ BALCO-SUB								
Thunder 105	1105	42½/5/16	2	Mech.	8½	double barb	\$64.00	The Thunder 105 and 90 are supplied with unusually short leaders for their size.
Thunder 90	1090	36/5/16	2	Mech.	5½	double barb	60.00	
Arrow 105-4L	1054	42/5/16	2	Mech.	6½	double barb	58.00	
Arrow 105	1052	42/5/16	1	Mech.	6½	single barb	56.00	The Arrow 90-1L has a stand- ard sling which differentiates it from Arrow 90 which has a screw-in sling.
Arrow 90	0902	35½/5/16	1	Mech.	5	single barb	50.00	
Arrow 90-1L	0901	35½/5/16	1	Mech.	5	single barb	48.00	
Junior 90	0090	35½/7 mm	1	Non-mech.	5	single barb	30.00	
Junior 65	0065	28/7 mm	1	Non-mech.	4½	single barb	26.00	
SCUBAPRO								
Panther 36	33-036-000	36/5/16	2	Mech.	10	double barb	\$95.00	Both Panther model guns have one piece barrel-muzzle-handle grip constructed out of glass reinforced, foamed polypropylene.
Panther 26	33-026-000	26/5/16	2	Mech.	6½	double barb	85.00	
Lightweight 43	33-643-000	43/1/4	1	Mech.	13½	double barb	66.00	
Lightweight 35	33-635-000	35/1/4	1	Mech.	10½	double barb	59.00	
Lightweight 25	33-625-000	25/1/4	1	Mech.	7½	single barb	54.00	
Bantam	33-622-000	28½/1/4	1	Non-mech.	4½	single barb	32.00	
SELPAC CAVALERO (Arbalete)								
Super Canon Deluxe	SAR 430	47/5/16	3	Mech.	14½	double barb	\$87.25	Arbalete guns have a model suitable for everyone whether novice or experienced.
Corsica Standard	SAR 417	44/5/16	3	Mech.	13	single barb	86.50	
Corsica Junior	SAR 416	41/5/16	3	Mech.	11½	single barb	81.90	
Maxi Canon	SAR 429	44/5/16	2	Mech.	13	double barb	72.50	
Compact Canon	SAR 427	40/5/16	2	Mech.	10½	double barb	60.50	
Mini Canon	SAR 428	25/5/16	2	Mech.	6½	double barb	60.50	
Polynesian Deluxe	SAR 421	44/5/16	2	Mech.	13	double barb	69.25	
Polynesian Standard	SAR 422	41/5/16	2	Mech.	11½	double barb	60.50	
Polynesian Junior	SAR 423	33½/5/16	2	Mech.	9	single barb	55.00	
Corsica Baby	SAR 415	23/1/4	1	Non-mech.	4	3 prong gig	27.00	
Corsica Revolver	SAR 414	17/1/4	1	Non-mech.	3	3 prong gig	25.75	
U.S. NEMROD								
Tiburon III	6363	40/5/16	2	Non-mech.	7½	single barb	\$110.00	Buoyancy chamber in barrels provides maximum stability and balance.
Tiburon II	6362	30/5/16	2	Non-mech.	6	single barb	105.00	
Tiburon I	6361	22/5/16	1	Non-mech.	4½	single barb	85.00	
Casador Senior		26½/5/16	1	Non-mech.	4	single barb	37.00	

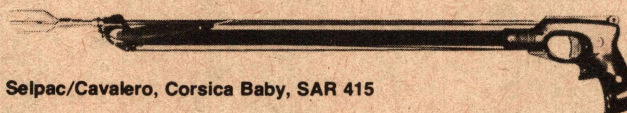
SPEARGUN ROUNDUP



Selpac/Cavalero, Corsica Standard, SAR 417



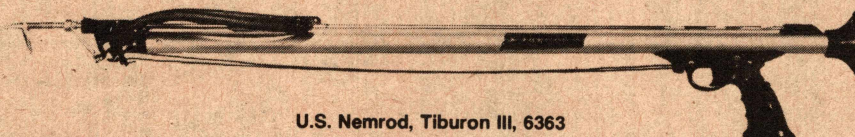
Selpac/Cavalero, Corsica Junior, SAR 416



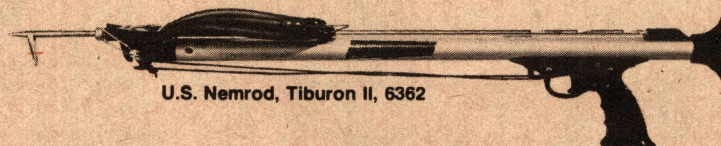
Selpac/Cavalero, Corsica Baby, SAR 415



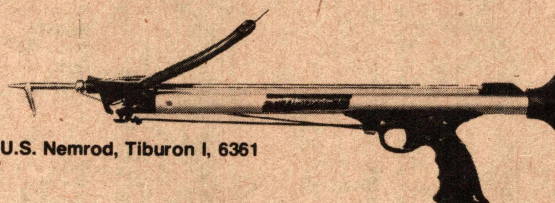
Selpac/Cavalero, Corsica Revolver, SAR 414



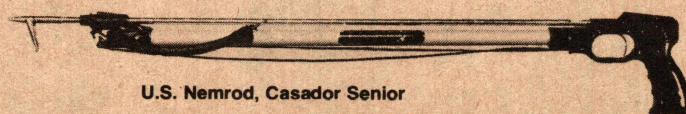
U.S. Nemrod, Tiburon III, 6363



U.S. Nemrod, Tiburon II, 6362



U.S. Nemrod, Tiburon I, 6361



U.S. Nemrod, Casador Senior

you were to fire a gun out of water, you might be surprised to see the shaft reach the end of its leader line and come back at you; or bounce off an object and return; or tear the muzzle off your gun. Two: The gun should be loaded only when you are in the water and in the hunting area. Guns should never be loaded out of water prior to entering; near a swim step; around other divers; or before crossing through the surf line. When you load the gun, you should do so with the safety on and be prepared for a pre-fire. Then you should release the safety once, to check for pre-fire with the safety off. The safety should then be left on until just before firing. Three: The gun should be disarmed before exiting the water, and away from other divers. If you choose to disarm the gun by firing it, make sure you aim it in a safe direction. Four: Remember that gun mechanisms wear out. Always assume that the gun may go off at any moment.

SPEARFISHING ETHICS

A good hunter is discriminating. He will have a good idea of what species to hunt, what size of fish is reasonable, and will have chosen a weapon that suits the preferred game. Matching the weapon with the fish is of prime importance. Shooting small fish with too large a gun may be rather ridiculous, but shooting a large fish with a too small gun is criminally wasteful. Before you purchase a speargun, have some idea of the kind and size of the fish you wish to hunt. Then choose the gun which will best handle that animal. Make certain that the spearhead provided is the most efficient one available for that size gun. In most cases, it is worthwhile to trade the standard spearhead in for a better head when you buy your gun. Generally, your best choice is a detachable head, and for big game it is a must. With the detachable head you will keep a greater percentage of the fish you shoot and you will bend fewer shafts.

If you are a beginner, don't just go out and shoot the first thing that swims by. Join a club or team up with an experienced spearfisherman who will provide advice. Your pro dive store can help you do this — ask. If you are diving a new area from a boat, ask the divemaster what fish are good game, and what size to look for.

Remember that when you are underwater your actions and your attitude will have a direct impact on the conservation of the sea. Even though this impact may be small, it adds up. Also remember that not all other divers are spearfishermen. Until you shoot a fish, it belongs to others as well as yourself. Place a value on the fish you intend to spear. Make sure you want to spear it, want to take it home, and want to eat it. Keep in mind that those other divers may place more value on that animal alive than you do dead. >

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This is Coastal's 31st year of training deep sea divers. Compare our years of experience. No other school comes anywhere close.

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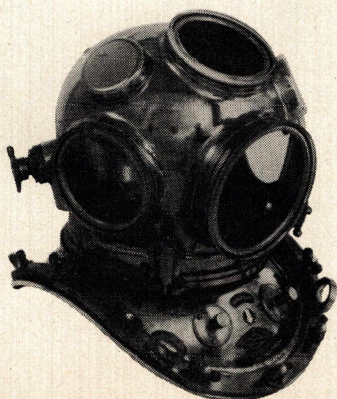
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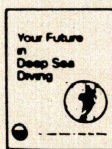
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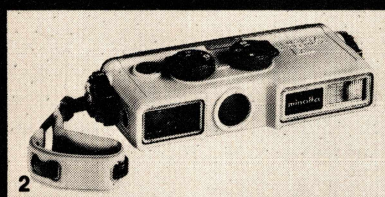
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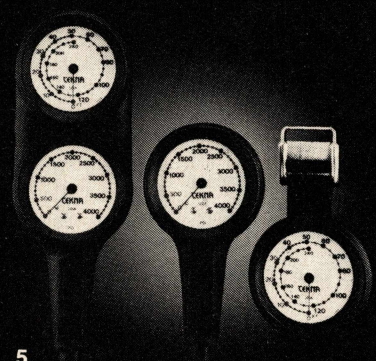
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1 Paddle Cat—A double-hulled, 12 foot mini-catamaran with a 23 inch wide trampoline deck. Weighing 40 lbs., the Paddle Cat is the most stable craft of its size afloat and one of the fastest, yielding cruising speeds of four-seven mph. \$595. From Paddle Cat, 1710 Decker Canyon Rd., Malibu, CA 90265.

2 Minolta Weathermatic-A — The world's first watertight pocket camera. Complete with a buoyant plastic body, all-glass lens, and built-in electronic flash. Its compact size and handy drop-in cartridge make it ideal for active lifestyles. \$160 from Minolta Corp., 101 Williams Drive, Ramsey, NJ 07446.

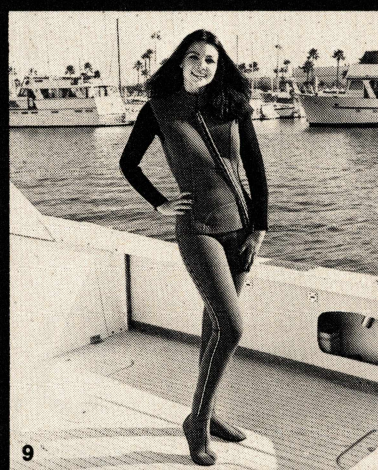
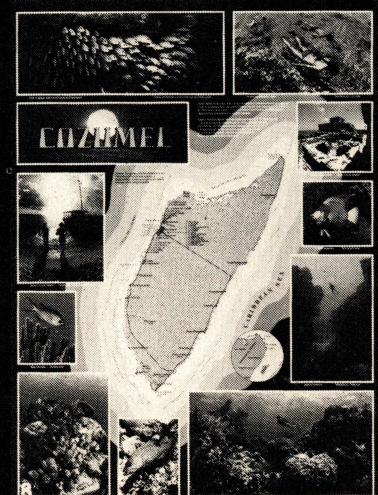
3 Portable Oil-Free Air Compressors — A new line of oil-free air compressors for filling dive tanks and fire/rescue air-packs. The units weigh between 95-145 lbs. and deliver 3-5.5 scfm at 3300-4500 psi. Choice of gas, electric or diesel drive. From \$2,950, Rix Industries, 6460 Hollis Street, Oakland, California 94608.



4 SeaJacket III — Features a color combination of blue, yellow and orange for visibility. One 25 gr. CO₂, two velcro hose retainers and 46 lbs. of buoyancy are standard. Complete with side gusset with length adjustment for a better fit. \$248 from SeaQuest Inc., 722 Genevieve St., Suite N, Solana Beach, CA 92075.

5 Tekna Instruments — The depth gauge can be calibrated for precise accuracy as well as altitude. Priced at \$64.95. The tank pressure gauge with a 270° dot matrix/ultraluminescent dial sells for \$69.95. A combination of the two in a neoprene housing is \$129.95. Tekna, 3549 Haven Ave., Menlo Park, CA 94025.

6 Ski and Dive Jackets — A new line of ski and dive jackets for men and women. The men's model is navy blue with light blue accent stripes, the women's is brown with light blue accent panels. Both have a front zipper, double velcro closure tail and internal key pocket. The 1/8 inch jackets are \$89 from Dacor.



7 Divemaster III — A submersible pressure gauge, depth gauge, and compass in a single housing. As a bonus, a 2 X 5 inch underwater slate is attached to the back of the module. The gauge housings are ABS plastic, the module housing is shock resistant high Durometer rubber. Retail for \$157.50 from U.S. Divers.

8 Cozumel Dive Map — Illustrates the best dive areas, hotels and dive shops, encircled by the beautiful U/W photos of Jerry and Michael Greenberg. This poster, along with five others, is \$15, plus \$3 postage and handling from Seahawk Press, 6840 S.W. 92nd St., Miami, FL 33156. A catalog is available for \$1.

9 Nylon Wetsuits — Scubapro's nylon wetsuits now use the same design concepts as Scubaproflex suits to provide more body area stretch, arm extension, and ease of putting on and taking off. Available in standard styles or personalized versions. All sizes for men or women. Sold in selected Scubapro shops.



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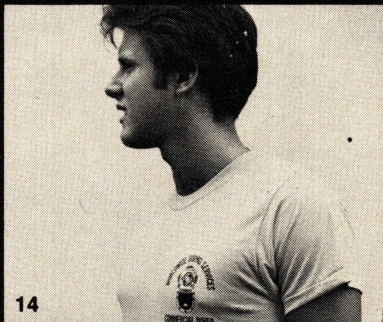
10 Formula I and Formula II — A new mask with wide vision and soft rubber. The low volume allows easy clearing, and the new ratchet type strap lock permits fast and easy strap adjustment. Yellow, orange, or blue single lens, \$30, double lens, \$29. From Mares, 722 Genevieve St., Suite N, Solana Beach, CA 92075.

11 Sea Otter II — In blue or yellow, it provides 43 lbs. of lift. Heavy Cordura nylon material resists punctures, cuts. Comes with Mariner Kam Bac Pac. Oral inflator has velcro hold-down and attached signal whistle. One hand inflation-deflation with lever dump and LP inflator. \$229.95 from U.S. Divers.

12 Oceanic 2001-S U/W Strobe — A slave sync model of the 2001. Can be fired by either manual flash synchronization or flash output from another strobe. Rechargeable, it provides 360 flashes from a full charge, recycles in six seconds. EO connector only. \$545. Farallon/Oceanic, 14275 Catalina, San Leandro, CA.



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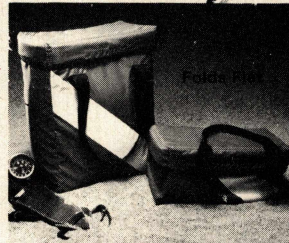
13 Lycra Wetsuits — Feature a blend of 30% Lycra spandex and 70% nylon, for 4 way flexibility. The suits are run-proof and stain resistant, have an unusually soft fit, and include non-jamming, self-cleaning zippers. Priced from \$211-261, from Parkway Fabricators, Inc., 241 Raritan St., South Amboy, NJ 08879.

14 Commercial Diver T-shirt — A T-shirt designed with the commercial diver in mind. The shirts are 50% polyester, 50% cotton, and have the Mark V deep sea diving helmet printed on the front. In sm., med., lge., and x-lge., \$7 plus 50¢ postage, from Worldwide Diving Svcs., P.O. Box 3132, West Palm Beach, FL 33402.

15 Marine Gallery — A collection of 34 underwater and topside marine scenes by top photographers. All images are offered in sizes 8 X 10, 11 X 14, and 16 X 20 as flush mounted prints, or mounted in mahogany or metal frames with two color mats. Prices range from \$15-80. From Scuba Chrome, 4911-W. Grace St., Tampa, FL.

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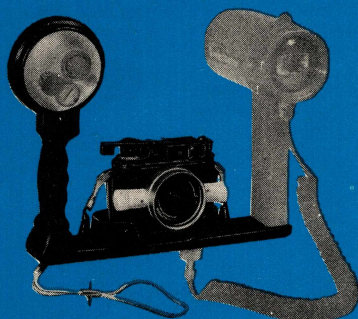
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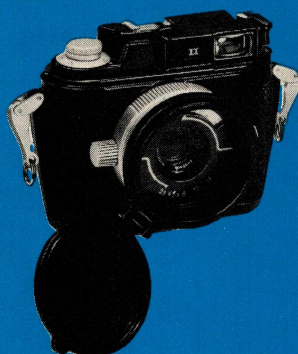
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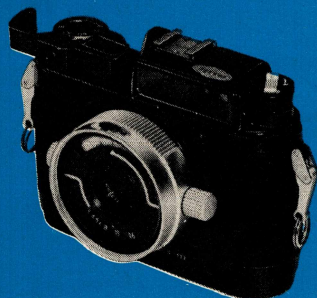
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DEALER AWARD

AMF Swimaster presented its outstanding dealer award to Scuba Sports of Miami, Florida at the 1980 DEMA show. Barry Zuccarini, Florida district



manager for AMF Swimaster, and Tom Pomeroy, national sales manager, presented the award. Lenny Panisch, president, and Henry DelCampo, vice-president, accepted the award for Scuba Sports.

Scuba Sports of Miami has three stores in Florida; 16604 NE 2nd Ave. North Miami Beach; 2738 S.W. 28th Lane, South Miami; and Perrine Plaza, Perrine. ➤

SALVO NAMED SALES & MARKETING DIRECTOR

Subsea Products, Inc., has named Larry Salvo director of sales and marketing. Salvo is also associated in the same capacity with Graflex, Inc., a topside professional photographic line. ➤

SAN DIEGO DIVE-A-THON

The San Diego Council of Divers, Inc., with Sunset Pools, Inc., will hold its 2nd Annual Dive-a-Thon for Muscular Dystrophy, August 23-September 1.

In the 1979 version of this event over \$5,000 was raised by divers from throughout California. At that time a new world record for continuous underwater backgammon was established at 332 hours, 2 minutes and 30 seconds. In 1980 a new world record will again be set; this time for continuous underwater Yahtzee. The goals for this year are: 216 hours and \$10,000.

All certified divers are invited to participate in this event. SDCD will teach you how to play and provide all tanks and regulators. All you need is a mask, suit and towel. Dive groups and clubs are invited to sign-up for block periods of time. To sign-up, or for additional information contact: San Diego Council of Divers, P.O. Box 9259, San Diego, CA. ➤

Scuba Quiz

Category: Pressure

By Dennis Graver

Divers must deal with pressure on each and every dive, so an understanding of the topic is of the utmost importance. Can you recall the important facts about pressure? Test your knowledge of pressure with the following questions. Answers are on the next page.

1. Select the incorrect statement:

- ☐ A. Pressure is force per unit area
- ☐ B. Underwater, pressure is the result of atmospheric and hydrostatic weight
- ☐ C. Pressure calculations are made using gauge pressure
- ☐ D. Pressure is equal in all directions at a specific depth

2. The pressure increase per foot of depth in fresh water is:

- ☐ A. .432 psi
- ☐ B. .445 psi
- ☐ C. 1.0 psi
- ☐ D. 14.7 psi

3. Gauge pressure for divers is:

- ☐ A. Hydrostatic pressure
- ☐ B. Atmospheric pressure
- ☐ C. Hydrostatic pressure plus atmospheric pressure
- ☐ D. Atmospheric pressure minus hydrostatic pressure

4. The absolute pressure at a depth of 120 feet in the ocean is:

- ☐ A. 51.8 psia
- ☐ B. 53.4 psia
- ☐ C. 66.5 psia
- ☐ D. 68.1 psia

5. The pressure in a scuba tank increases because of an increase in temperature. This is an example of:

- ☐ A. Charles' Law
- ☐ B. Dalton's Law
- ☐ C. Boyle's Law
- ☐ D. None of the above

6. A given volume of air in a flexible container will expand the most during an ascent from:

- ☐ A. 198 feet to 99 feet
- ☐ B. 132 feet to 66 feet
- ☐ C. 99 feet to 66 feet
- ☐ D. 33 feet to the surface

7. If a scuba tank contains 80 cubic feet of air at a pressure of 3000 psig, how much air does it contain at 2000 psig? (Temperature remains constant.)

- ☐ A. 52.8 cubic feet
- ☐ B. 53.3 cubic feet
- ☐ C. 53.5 cubic feet
- ☐ D. 120 cubic feet

8. At an altitude of 18,000 feet, the pressure will be approximately:

- ☐ A. One-half the atmospheric pressure at sea level
- ☐ B. Twice the atmospheric pressure at sea level
- ☐ C. One-eighteenth the atmospheric pressure at sea level
- ☐ D. Equal to the atmospheric pressure at sea level

9. If two percent of the air in a scuba tank were carbon monoxide, the partial pressure of the carbon monoxide in air breathed from that tank at a depth of 102 feet in fresh water would be:

- ☐ A. 1.88 psia
- ☐ B. 1.176 psia
- ☐ C. 44.1 psia
- ☐ D. 58.8 psia

10. If a cubical container measuring ten inches per side were sealed at atmospheric pressure and taken to a depth of 20 feet in the ocean, the total crushing force on the container would be about: (Assume wall thickness of container is zero and that container is flexible.)

- ☐ A. 3,560 pounds
- ☐ B. 5,256 pounds
- ☐ C. 5,340 pounds
- ☐ D. 14,076 pounds

Scuba Quiz

Answers: Pressure

1. C. Pressure calculations are made using gauge pressure. This is false. Absolute pressure, or zero-based pressure, must be used for calculations because divers are subject to the pressure of both water and the atmosphere. Remember to include atmospheric pressure when making pressure calculations.

2. A. .432 psi. Thirty-four feet of fresh water equals one atmosphere of pressure, or 14.7 psi. One foot of fresh water equals $14.7/34 = .432$ psig (gauge pressure).

3. A. Hydrostatic pressure. Gauge pressure is the difference between a pressure being measured and the surrounding atmospheric pressure. A gauge pressure reading of zero is actually one atmosphere of pressure.

4. D. 68.1 psia. Salt water weighs .445 pounds per foot, so the gauge pressure is $120 \times .445 = 53.4$ psig. To convert gauge pressure to absolute pressure, add 14.7 psi for a total of 68.1 psia.

5. D. None of the above! It is a misconception that a pressure increase due to temperature increase in a scuba tank is due to Charles' Law, which really says that the volume of a fixed quantity of gas at constant pressure is proportional to the absolute temperature. The correct law is Amonton's Law, which states, "The pressure of a fixed quantity and volume of gas is directly proportional to the absolute temperature."

6. D. 33 feet to the surface. The equation $P_1V_1 = P_2V_2$ is used to figure the change in volume. P_1 is the starting pressure, V_1 is the starting volume, P_2 is the final pressure, and V_2 is the final volume. To find V_2 , or the final volume, the equation is rearranged to $V_2 = P_1V_1/P_2$. For answer A, if the starting volume were, say 10 pints, the ending volume would be $102.8 \times 10/58.8 = 17.5$ pints. Using the same starting volume, the final volumes for answers B, C, and D are 16.7, 13.4, and 20 pints respectively. Note that the greatest rate of change in volume occurs near the surface.

7. C. 53.5 cubic feet. The pressure/volume relationship in a tank is expressed $P_1/V_1 = P_2/V_2$. Rearranged, $V_2 = P_2V_1/P_1$ or $V_2 = 2,014.7 \times 80/3,014.7$ (remember to use absolute pressure . . .) = 53.46 cubic feet of air. For general use and practical purposes, you could say the tank was two-thirds full.

8. A. One-half the atmospheric pressure at sea level. Atmospheric pressure decreases with altitude, and 18,000 feet is the point where the pressure is half that at sea level. Note that going from sea level to 18,000 feet is equivalent to going from 33 feet to the surface. Remember that special procedures are necessary for altitude diving.

9. B. 1.176 psia. The absolute pressure at 102 feet is $102 \times .432 = 44.1 + 14.7 = 58.8$ psia. The partial pressure of carbon monoxide is $58.8 \times .02 = 1.176$ psia. Note that breathing 2% carbon monoxide at 102 feet is equivalent to breathing 8% carbon monoxide at the surface ($14.7 \times .08 = 1.176$) and the physiological effects would be the same.

10. C. 5,340 pounds. The area of the container is $10 \times 10 \times 6 = 600$ square inches. The absolute pressure at 20 feet is $.445 \times 20 = 8.9 + 14.7 = 23.6$ psia. The total pressure on the outside of the container is $23.6 \times 600 = 14,160$ pounds. The pressure on the inside of the container is 14.7×600 (same area) = 8,820 pounds. With 14,160 lbs. pushing inward and 8,820 lbs. offsetting the outside pressure, the difference, or crushing force on the container is 5,340 pounds.

Divers do not have to make pressure calculations in order to dive, but they must understand the principles involved. If you scored well, you certainly understand the principles and probably enjoy the academics of diving. If you understand the principles, but couldn't work the problems correctly, don't feel badly. You may be motivated to study the subject, or to take a continuing education course in diving.

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A news release circulated by the Marine Wilderness Society in March of this year warned: "HR 5018 is a bill now working its way through Congress that, if it passes, will repeal the entire U.S. Marine Sanctuaries Program. This will abolish the safeguards which now protect Molasses Reef and all other major coral reefs in Pennekamp Park."

What this means to divers, according to Marine Wilderness president, Alexander Stone, is that the only existing federal law providing protection from exploitation for one of America's most beautiful underwater playgrounds will be eliminated. Included will be two ex-

isting sanctuaries: The Key Largo Coral Reef Marine Sanctuary off Florida, and the Civil War wreck of the ironclad *Monitor* off North Carolina. Also affected will be the proposed new sanctuaries for such vital areas as: The Flower Gardens in the Gulf of Mexico; the Northern Channel Islands and Santa Barbara Island off California; California's Monterey Bay; the Farallon Islands; Florida's Looe Key; coral reefs off St. Thomas in the Virgin Islands; and Gray's Reef off Georgia. Also under consideration is the possibility of creating a sanctuary in Hawaii to protect the winter habitat of the humpback whales; this too may be cancelled.

HR 5018 was introduced by Congressman John Breaux of Louisiana, but its real backers and beneficiaries are the big oil interests which are taking advantage of the fears generated by the energy crisis to abolish any semblance of environmental controls over their offshore operations. The legislation proposed is, "To repeal Title III of the Marine Protection, Research, and Sanctuaries Act of 1972." This section authorizes the Secretary of Commerce, with Presidential approval, to designate ocean waters as marine sanctuaries for the purpose of preserving or restoring their conservation, recreational, ecological, or esthetic values. Ma-

SAVE THE



rine sanctuaries may be designated as far seaward as the outer edge of the continental shelf, and in coastal waters where the tide ebbs and flows; or in the Great Lakes and their connecting waters. Marine sanctuaries are built around the existence of distinctive marine resources whose protection and beneficial use requires comprehensive, geographically oriented planning and management. The Marine Sanctuaries Act is administered by the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce.

Congressman Breaux and big oil contend that natural marine areas and re-

sources are amply protected by the abundance of other federal environmental laws — and that the Marine Sanctuaries Act is overlapping these laws, causing an unnecessary expense to ocean operators. Such claims are a joke to those who are familiar with the actual situation. All other federal laws designed to protect marine areas are either aimed at a specific activity, or can only be brought into play after damage to marine life has occurred. Then this damage must be legally proven as caused by a specific activity or material. Big oil and other major ocean polluters are aware that such laws, even when well intentioned by the

Congress, can be easily sidetracked or nullified by manipulating the regulations governing implementation and enforcement. Prime examples are the federal laws governing ocean dumping and pollution from ocean outfalls.

The laws governing ocean dumping and sewage discharges clearly state that, "applications for permits for dumping or other discharge of any materials into the marine environment be evaluated on the basis of the impact of these materials on the marine environment and on marine ecosystems . . ." The laws are administered by the EPA which has a published policy, "to prevent or strictly

SANCTUARIES

**HOUSE BILL 5018 THREATENS TO
ANNIHILATE AMERICAS UNDERWATER PARKS**

BY BILL BARADA

photograph by Geri Murphy



regulate the dumping of any material in the ocean which would adversely affect human health welfare, or amenities, or the marine environment, ecological systems, or economic potentialities, or plankton, fish, shellfish, wildlife, shorelines or beaches."

The criteria used to enforce these laws, however, is the antiquated, discredited theory that, "dilution, and dispersal is the solution to pollution." Thus cities, counties and industries are permitted to dump horrendous quantities of poisonous industrial chemicals and wastes, along with human and animal wastes, into ocean outfall sewers and by direct dumping under permit — which is justified on the basis that these wastes are diluted and dispersed to the point that they are harmless to marine life. This policy has been followed for more than 30 years, and the result has been the destruction of vast areas of once productive marine systems vital to our nation's survival.

In July, 1976 all of the marine life in more than 4000 square miles of ocean bottom off the New York/New Jersey coast was annihilated. (SKIN DIVER June 1977.) The ocean floor was littered with the carcasses of millions of dead sea creatures including lobsters, clams, scallops, mussels, and fish. Nothing in the affected area survived. Even sea worms, some of the toughest of all sea creatures, crawled up on the sand and died. All evidence pointed to EPA permitted ocean dumping in the area as the cause of this holocaust. But governmental officials and the polluters officially attributed the cause to "lack of oxygen" and they played scientific mumbo-jumbo about possible "natural" causes. Thus, they refused to change and the ocean dumping continues.

prevalent around outfall discharge pipes — the officials stated that because nobody knew what conditions were like 30 years ago, they assumed that existing conditions were normal. The outfalls were approved as viable methods for sewage disposal.

In the Great Lakes, Lake Erie is so badly polluted it has been termed dead. Lake Michigan is not much better off. The hoped for commercial fishery based on coho salmon never materialized because the fish are too contaminated to meet U.S. health standards. Lake Superior, the world's largest body of fresh water, is becoming polluted with cancer-causing asbestos particles that threaten public drinking water supplies.

The Gulf of Mexico has been a garbage pail for ocean dumpers and polluters for more than 30 years. (SKIN DIVER April, 1975). Commercial fish catches are declining. (SKIN DIVER November, 1979) and massive fish kills are a routine occurrence. The tiny, ten-square-mile area of the Flower Garden Coral Reefs was selected as an approved ocean dumping site for toxic chemicals, (SKIN DIVER April, 1975) and is now a battleground between oil companies that demand unrestricted drilling rights and environmental, civic, and other organizations that demand the oil drillers take the measures required to protect the corals. The Flower Gardens was proposed as a marine sanctuary in 1973. This died because of oil company opposition. The sanctuary proposal was renewed again in 1977, and is again being fiercely opposed by Big Oil.

And so it goes, an old, old story repeated around the nation's coastline. America's most prolific seafood producing areas are disappearing at an alarming rate. And now Big Oil and its political

vision supported the need for the Marine Sanctuaries Act as providing a unique protection unavailable from any, or all, other federal laws. The report concluded, according to the Marine Wilderness Society, that:

1) The Marine Sanctuaries Program gives the most thorough protection to marine wildlife. 2) Only the sanctuaries program protects ecosystems per se, with a comprehensive management approach of unmatched flexibility. 3) Only the sanctuaries program provides a holistic approach to the management of defined areas. 4) Only the sanctuaries program works to prevent problems, instead of reacting to them. 5) The sanctuaries program fills gaps in the regulation of oil and gas activities, hazardous waste pollution, vessel traffic, fishing, anchoring and certain types of littering. 6) The sanctuaries program is not a general ocean management program. It is geared to protect specific sites of recognized value and fragility from clear threats and anticipated impacts.

Representative Breaux stated that the parts of the study which disagreed with his conclusions, "appear to be misconceived . . ." An accusation that is sure to trigger a rebuttal from the scholarly Congressional Research Service.

Despite propaganda circulated by Big Oil and its political puppets, the Marine Sanctuaries Act does not prohibit oil drilling within the boundaries. As stated by the Secretary of Commerce in support of the Act, "After designation of a sanctuary, the Secretary may issue necessary and reasonable regulations to control activities within the sanctuary and must certify that activities permitted by other agencies may be carried out in the sanctuary." The Act also requires consultation with the Secretaries of State, Defense, In-

SAVE THE SANCTUARIES

South Florida, where raw sewage has been spewing into the ocean for more than 30 years, was once such a famous sport fishing ground that it attracted anglers from all over the world. The abundant populations of game fish no longer exist, however, and fishing guides in the Miami/Ft. Lauderdale area usually take their customers more than 30 miles north to assure a decent catch. Government officials exonerated the sewage outfalls as the cause of declining fish populations, however. Even though scientists reported that bottom corals and other benthic organisms were highly stressed, and that sick and diseased fish were

puppets are demanding the elimination of the only federal law on the books that is capable of protecting vital marine ecosystems before they are wiped out — on the grounds that these areas are already protected by existing laws.

Congressman John Breaux tried to obtain support for his claim that the Marine Sanctuaries Act was unnecessary and overlapped other laws by requesting the Library of Congress, Congressional Research Service to survey the effects of all marine environmental laws as compared with that of the Sanctuary provisions. To Congressman Breaux's dismay, the scholarly report by the American Law Di-

terior, Transportation, Environmental Protection Agency and other Federal agencies prior to designation.

Thus, oil companies have ample opportunity to make their position known before a sanctuary is established — and when they want to drill in an established sanctuary, the only requirement is that they comply with "reasonable regulations" needed to protect the resource.

The chief danger to marine ecosystems from oil drilling operations is from the discharge of drilling muds and drill cuttings as the hole is being bored. This is not a minor source of pollution. Drilling muds may contain as many as 1000 dif-

ferent chemicals, very few of which have been tested for toxicity to marine life. Muds also contain a variety of toxic metals such as mercury, arsenic and cadmium; plus agents such as PCB's, which are known to be accumulated and concentrated by marine organisms as they pass upward through the food chain.

Each well will usually discharge drilling muds at least twice during operations at a volume up to 7000 barrels of mud for each well. Most leased areas will have around 150 producing wells, which means that around one million barrels of toxic mud will be discharged in most productive leased areas. Visible mud plumes have been known to travel at least two miles; the distance invisible plumes travel is unknown.

The oil companies point to the more than 3000 wells already operating in the gulf with no apparent damage to marine life as evidence that regulations are unnecessary. These no damage claims are not supported by scientific studies or other creditable evidence, however, because no such studies were ever made. Nobody, including the oil companies, knows how much marine productivity has been destroyed by these operations because nobody knows what the gulf floor was like before drilling operations began. What is known is that many of the fish that collect beneath offshore drilling rigs have abnormal concentrations of toxic metals, and other accumulative contaminants in their flesh.

The fact that Big Oil has selected the Marine Sanctuary Program as the target for its opening battle against environmental regulations is significant. The two established sanctuaries and seven proposed sites represent too small an area of ocean to warrant this kind of attention. The sanctuaries attack is a test case intended to force the politicians and the public to choose between energy production, and environmental controls designed to protect natural resources from degradation by this production. If the oil companies win this one, we can kiss virtually all marine fisheries goodbye. If the Marine Sanctuaries Act is repealed, the repercussions will spread to all other areas of government and drastically weaken the efforts of Federal agencies to protect the ocean. No Federal agency can successfully battle the combined political power of wealthy oil lobbyists without overwhelming public support. And Big Oil is supremely confident of winning this environmental war.

In fact, the initial skirmish has already been fought, and won by Big Oil. The Georges Bank, at present the world's most productive fishing grounds, was proposed as a marine sanctuary in order to protect the fisheries habitat from irreversible damage from drilling operations. The oil companies objected to the proposal, and NOAA backed off, withdrawing

the Georges Banks from consideration as a Marine Sanctuary. The excuse presented to the public was the same as that given for exterminating all marine sanctuaries. The oil companies claimed that sufficient protection was provided to marine life by the terms of their lease from the Bureau of Land Management. The comments of the Congressional Research Service on this matter are revealing.

The Research Service report states, "One way to compare these alternative approaches to protection is to look at the level of risk to the Georges Bank ecosystem. A sanctuary designation can mini-

mize the risk, if it is backed by the array of supporting Federal protective statutes and regulations. The question for the decision-maker is whether the reduction of risk is more desirable than the potential adverse economic impact of unexploited resources. If the area is leased (as it has been), then environmental protection is controlled by the supervisor, who is not a scientist and whose prime responsibility is exploration for oil and gas within the constraints of Federal law. His perspective on how to search out and respond to changing environmental conditions, as called for in the operating orders, will be different from an individual who is respon-

WRITE YOUR CONGRESSMAN

These are the U.S. Congressmen who will vote on HR 5018 (to repeal the Marine Sanctuaries Act), as members of the House Committee on Fisheries and Merchant Marine. Find the one(s) from your state, and write today asking for opposition to HR 5018 and the repeal of this vital Act.

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SAVE THE SANCTUARIES

sible for managing a sanctuary."

Thus, without a sanctuary designation, the policy on the Georges Bank will be, "drill for oil and to hell with the fish, that's not our problem." This will be true for Pennekamp's reefs, Looe Key, Key Largo, and all other sanctuary proposals if HR 5018 is passed by Congress.

The Marine Wilderness Society is spearheading an effort by the Marine Sanctuaries Coalition to urge the support of skin divers and diving organizations in opposition to HR 5018. Alexander Stone, Marine Wilderness Society president, says that writing your Congressman and insisting that he vote *against* HR 5018 and against the repeal of the Marine Sanctuaries Program is crucial to the future of recreational diving. Your letters don't have to be literary masterpieces, or lengthy treatises on environmental law. But if divers are not willing to take the time and trouble to let their wishes be known on an issue as vital as this, Big Oil and their political puppets can rightfully claim that sport divers don't really give a damn about what happens to their underwater world.

The Marine Wilderness Society is asking divers and dive organizations for financial contributions to help defray the cost of collecting and disseminating information on the Marine Sanctuaries fight. For up-dated information, and to help in the fight, send your check to: Marine Wilderness Society, P.O. Box 943, Miami, FL 33165. >

PADI PHOTO CONTEST

The PADI Training Facility Program will hold its second annual U/W Photography Search/Competition August 1-September 30. The competition provides an opportunity for amateur photographers to win prizes, and be published in SKIN DIVER and PADI's Undersea Journal. Once again, the Grand Prize will be an all-expense paid one week dive vacation. The theme for this year will be Underwater Color, and therefor only color slides will be accepted for consideration.

Entries may be made only through participating PADI Training Facilities. An entry fee of \$4 must accompany each slide submitted, and there is no limit to the number of entries. The photographer retains all rights to his photos. Entries will not be accepted by PADI Headquarters except through PADI Training Facilities. For a list of PADI Training Facilities in your area contact: PADI Training Facility Program, 2064 N. Bush Street, Santa Ana, CA 92706 >

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this unique piece of gear. Dr. Egstrom, a professor of kinesiology at UCLA, is well known in the dive industry for his equipment testing.

According to Archie Haugan, owner of Desert Divers dive shop in Las Vegas, the 2000 was conceived as a gag door prize several years ago. The winner was led to believe that he/she had just won the very latest in dive equipment. In reality, the Divers System 2000 is a conglomeration of nearly everything but the kitchen sink. Among its unusual features are a rearview mirror and two air horns.

PADI COLLEGE BIO MARINE COURSE

PADI International College has added a new aquatic awareness outreach course to be directed by Dr. Bert Kobayashi. The course offers three units of University of California, San Diego extension credit. Involving 36 hours of classroom and ocean studies, the course was specifically tailored by Dr. Kobayashi to



present a practical academic approach for the dive instructor. Both freshwater and ocean environments are taught, along with classification of aquatic animals/plants. Special emphasis is placed on collection preservation, aquaria, kelp, and methods and problems in research diving. An actual research diving project is undertaken. Sampling protocol, methods of recording, computation and analysis of data, and reporting of results are also covered. Write the PADI International College, 1310 Rosecrans, Point Loma, CA 92106.

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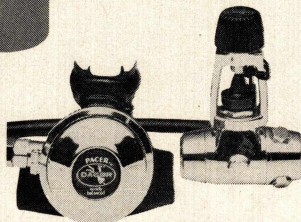


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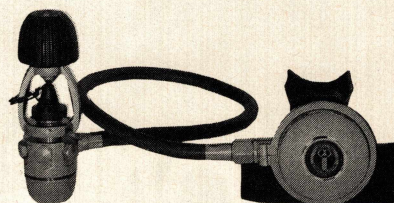


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Text and Photography by Rod Anton



Hermissenda crassicornis, common here, atop a pink sponge.



Strawberry anemones, *Corynactis*, abound in Monterey.

Nestled among the stately pines and cypress trees along famous Seventeen-Mile drive is, for many, one of the major attractions of the Monterey/Carmel area — the Pebble Beach Golf Course.

But for the diver, the major attraction lies approximately three-quarters to one mile offshore beneath the 56°F waters of Carmel Bay. Another world, so close, yet so far from the protection of the clubhouse comforts. The pinnacles, an area comprising approximately two acres, lie in water 90 to 110 feet deep. They consist of two mountain-like structures located approximately one-quarter mile apart. The Inner Pinnacle juts to within 20 feet of the surface, sometimes causing a boiler at the surface, because of the open ocean swells in that area. The visibility is usually 30 to 40 feet — quite often, much better — and on occasion, 80 feet or more. A large kelp bed is prominent over each Pinnacle, and is one of the distinguishing features of the area.

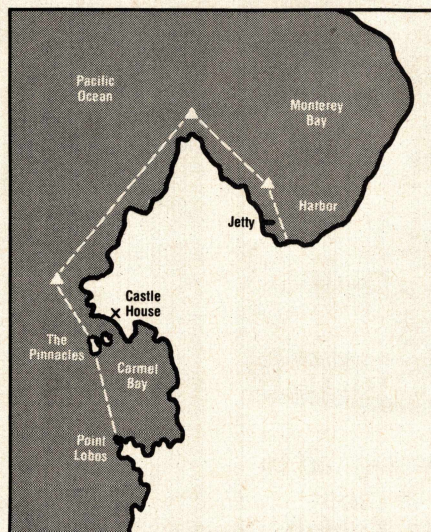
The topography of the Inner Pinnacle is very much like a mountain peak. Sheer faces cut sharply to deep crevices, then rise abruptly again to form another peak. Most faces of this pinnacle slope 15 to 30 degrees, with small ledges and pockets where a diver can snuggle in and photograph to his/her heart's content. The mind-blowing aspect of this area is that not one square inch is devoid of life.

Nature's carpet has been allowed to run amok, covering the slopes with every color in the rainbow. Strawberry anemones, *Corynactis*, are so lush the terrain takes on the look of red velvet interwoven with pink lace. Encrusting sponges in brilliant oranges, yellows and shades of white are common. Chestnut cowries graze amidst the landscape gracefully adorned in their delicate mantles. There are so many types of nudibranchs, it's easy to lose count. One of the most common in numbers, but certainly not in beauty, is the *Hermisenda crassicornis*, the horned nudibranch. Sharing the territory with these beautiful shellless snails, is one of the most exquisite shelled snails on the entire California shoreline — *Calliostoma annulatum*, the ringed top shell. It boasts a beautiful shell of beaded texture, ringed with purple and gold.

This myriad of marine life on the bottom is so enthralling that if it were not for the descent and ascent, one would overlook any other dive area. The area from just beneath the kelp canopy through mid-water is inundated with large schools of blue rockfish. The magnificent, giant purple medusa, *Pelagia panopyra*, frequently pulsates through these liquid skies, forming images of tiffany lamps. Upon closer inspection of these fluid creatures,

one notices a symbiotic relationship taking place. The tiny medusa fish darts in and about the protection of the medusa's mantle and tentacles, attracting would-be predators, who become unsuspecting victims of the medusa's stinging cells.

The Outer Pinnacle is also blessed with an overabundance of marine life, but the topography is very different. The Outer Pinnacle has plateau-like tops, one of which comes within 50 feet of the sur-



The map illustrates the ten mile boat run from Monterey Harbor to Monterey's pinnacles.

face. The majority of peaks are within 65 to 70 feet of the surface. Immense box canyons lie between the plateau-like areas with valleys that drop 90 to 110 feet deep.

Another eye catcher, if one can separate this visual onslaught of so many different things, is the incredible number of large red *Tealia* anemones in the rifts and crevices of the canyons. An occasional white *Tealia* appears in sharp contrast to the red ones. Also very apparent are the numerous sun stars, (*Pycnopodia helianthoides*), foraging about the sand and crevices.

As if this array of marine life wasn't enough for one area, an unusual phenomenon occurs along the walls of these canyons and on the plateaus. This far north on the California coast, one would not expect that the beautiful hydrocoral, *Allopora porphyra*, considered somewhat rare by various authorities, would exist. It abounds in all its glory, in bright purple and pastel pink. It is referred to locally as candelabra coral. Its polyps never come out, even at night, as true corals do, but always remain semi-retracted within their skeletal confines. This area also has a true coral, *Balanophyllia elegans*, which dots the seascape with its brilliant orange polyps.

Dispersed throughout the nooks and crannies are numerous species of bottom fish. The ugliest of all is the cabezon, considered by many to be the best eating fish of the area. Another excellent eating fish is the lingcod. Adding to the local color are many copper rockfish, along with their cousins, the black and yellow rockfish and the gopher rockfish. Perhaps one of the prettiest fish of the area is the kelp greenling, locally referred to as a sea trout. These are but a few of the multitude of species that exist.

One way to become a participant in this spectacle is to take a boat ride. Divers who have their own boats usually reach the area by following the marker buoys out of Monterey Harbor to Point Pinos, then continue up the coast until they reach the Cypress Point marker buoy. Once past Cypress Point, angle into Carmel Bay slightly until the boat is in a direct line between Cypress Point and Point Lobos. Travel this line towards Point Lobos until you see a lone house along the shoreline, known as the Castle House. Start looking for the kelp beds when the house is clearly in view. The Outer Pinnacle kelp bed should be in the immediate vicinity when you are in a direct line with the Castle House. Once the kelp bed is found, head directly toward the Castle House and encounter the Inner Pinnacle kelp bed within one-quarter of a mile. Remember, this is open ocean. Only experienced boaters should attempt this run. It is a wise practice to slow down on your way out and record the type and number of the marker buoys for reference, in case the fog starts to roll in before you depart for home. A good depth finder is considered by many to be a necessity, and it is a definite asset in locating this remote dive location. It is best to dive here in the early part of the day, as the winds usually pick up during the late afternoon. The run out of Monterey Harbor's two available boat launching ramps takes from 45 minutes to one hour and 15 minutes, depending on size and type of boat.

Probably the best and safest way for most divers to reach the pinnacles is to go out on the dive boat which makes the run from Monterey Harbor. A 38 foot craft which can handle up to 16 divers, the *Monterey Spirit* is operated by Sul-Nautics Enterprises. For specific information on the company's dive trips write: 1278 Regency Drive, San Jose, California 95129. Or call (408) 446-2969.

For those who are willing to brave the 55° waters, the rewards will be many. Certainly, it will take more than one page in your dive log to record the memorable experiences of the place known as the Pinnacles. 🐠

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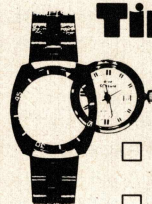


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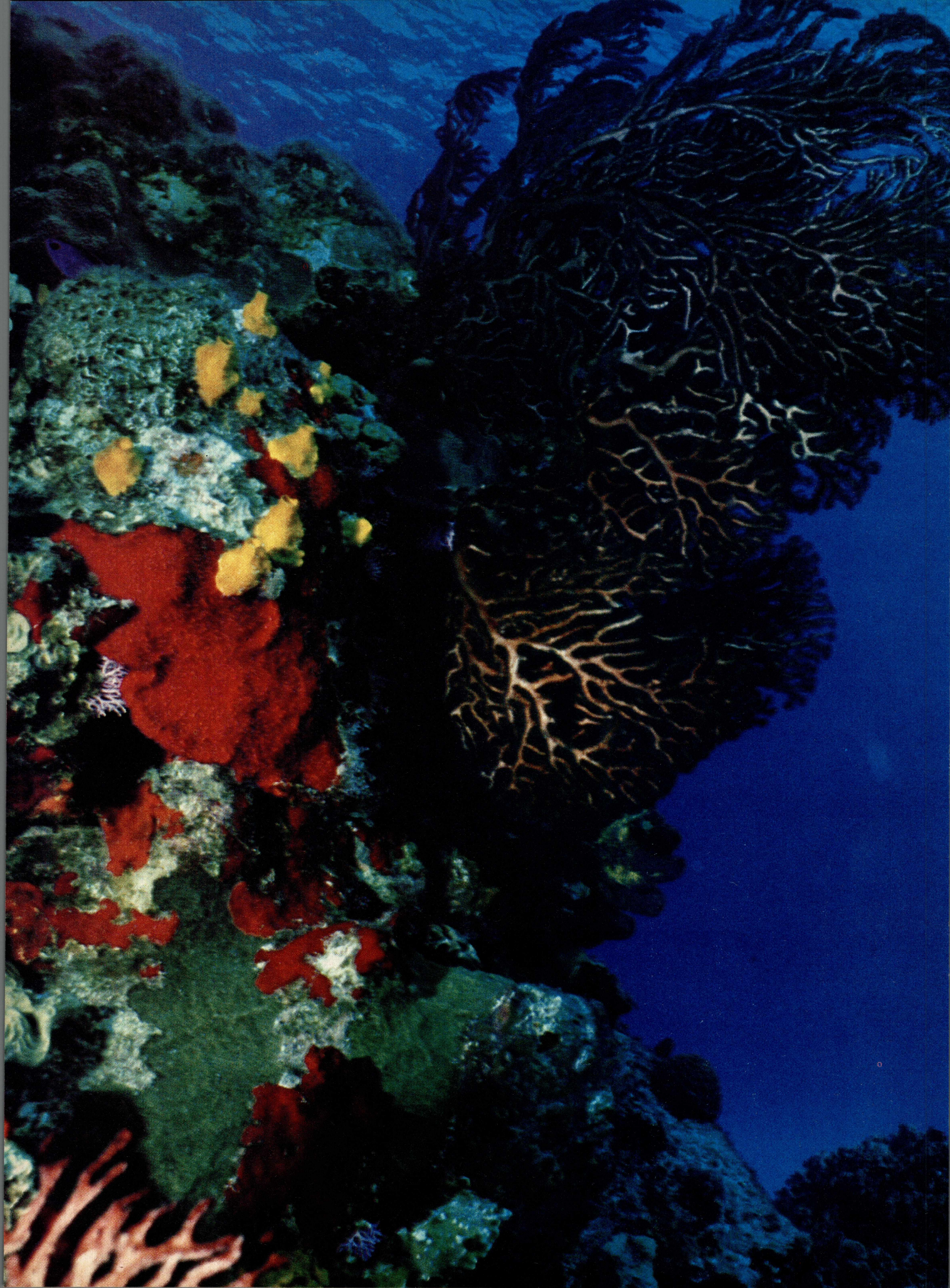
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COZUMEL

An underwater photograph serves as the background for the cover. It depicts two divers in a deep blue environment. On the left, a diver in a black wetsuit and yellow BCD is suspended in the water, facing right. On the right, another diver is partially visible, seemingly interacting with a large, dark, and textured rock formation. The scene is dimly lit, with light filtering from above, creating a sense of depth and mystery.

*Mexico's Enchanted Isle
in the Western Caribbean*

*Skin Diver Magazine
Special Supplement*



VIVA COZUMEL!

*Mexico's Ancient Mayan Shrine Has Become
A Modern Day Mecca For Divers*



Since the dawn of civilization, the island of Cozumel has held a compelling attraction for all men of all time. Its recorded history dates back more than 3500 years and is filled with magic, mystery and magnificent treasures. Over the ages it has become a repository of ancient pyramids, pre-Columbian jade carvings, and pirate gold.

In ancient times, Cozumel was a sacred shrine for a long lost civilization known as Maya. The island was an idyllic sanctuary for their high priests who worshipped the sun and practiced highly advanced sciences. The remains of their stone temples are still buried in the dense jungle of this island's interior. While little is known of their strange culture, a recently salvaged cache of sunken jade carvings provides a fascinating clue to their glorious past.

Even in those ancient times, Cozumel was a popular health spa. The island's balmy climate and purified waters magically healed both the aged and the sickly. Mayans would make long and difficult pilgrimages to this island in the hope of healing a nagging sickness or injury.

When Spanish conquistadores first arrived in the New World, they used Cozumel as their early base of operations for exploration of the Yucatan. Less than 200 years later, the island became a pirate stronghold. The reefs and ocean floor surrounding Cozumel still hold the battered remains of many treasure ships of bygone battles.

Today, the treasure of Cozumel lies in

photograph by Geri Murphy

By Paul J. Tzimoulis

Paraiso Reef

VIVA COZUMEL!

its tropical climate, powder white sand beaches, and shimmering waters of iridescent blue. It has become Mexico's most magnificent island resort, attracting vacationing tourists from Europe, the U.S. and Mexico itself.

Above all, Cozumel has become a 20th century mecca for snorkelers and scuba divers. This new cult of undersea worshippers have established their own temples: Palancar Reef, Santa Rosa Wall, Paraiso Reef, and others. Cozumel now ranks among the top five resort diving areas in the world today, with over 30,000 divers visiting annually.

GEOGRAPHY

Cozumel is a bean-shaped island measuring 28 miles in length and 9 miles in width. Low lying, it has a coral and limestone base, and its highest point is approximately 40 feet above sea level. Over 90 percent of the land is still covered with dense jungle brush which provides a refuge for many small tropical animals such as iguanas, wild parrots, etc. There are no poisonous snakes or dangerous creatures of any kind. The island is circumscribed by a band of iridescent

blue which marks the shallow coral reefs and sandy areas. It is this shimmering aquamarine luminescence which tourists find so appealing for water sports.

Cozumel is the largest of Mexico's off-shore islands, approximately 12 miles from the Yucatan Peninsula. A deep water channel runs between the island and the Mexican mainland with depths averaging 6000 feet. Because of the undersea topography, Cozumel is blessed with a steady flow of clean, clear ocean water which creates extraordinary underwater visibility and flourishing coral reefs. The island lies on approximately the same tropical latitude as Grand Cayman and Haiti. Water temperatures range from 80 to 84 degrees and the air temperature runs from 80 to 90 degrees. The balmy climate is a pleasant blend of strong tropical sun and cooling sea breezes.

HISTORY

The Mayans originally called Cozumel, *Ah-Cuzamil-Peten*, which means place of the swallows. The island once served as a resting place for the great numbers of swallows migrating from Florida to Central America.

Cozumel's earliest recorded history dates back to 1500 B.C. when the Yucatan Peninsula was inhabited by a mysterious civilization known as the Maya. At the height of their reign, several million Mayans lived in the Yucatan area. The Mayans were different from most other people in the Western Hemisphere. They were the only group to develop a written language consisting of blips and sym-

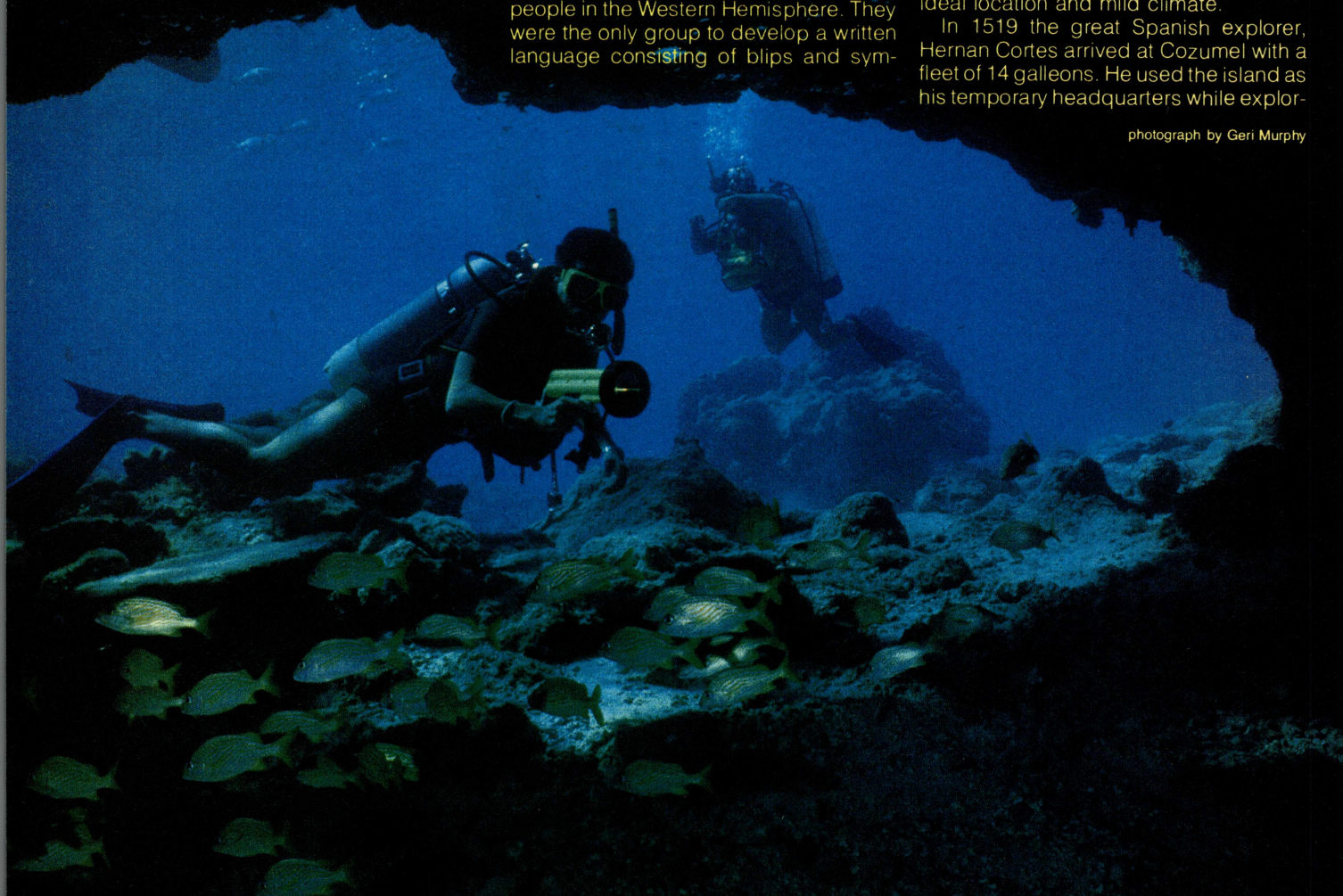
bols. They also developed an incredibly accurate calendar which recorded the years as accurately as we do today. They constructed giant pyramids equal to those of Egypt and became experts at both astronomy and mathematics. In its time, Cozumel was considered one of the most eastern points of the Yucatan Peninsula: It was the place where the sun rose each morning. Because of its position it became a place of great religious importance. Over 30 temples were constructed on this island and the high priests of the Mayan religion chose this island as their sanctuary for worship and scientific study.

Cozumel also became a popular health spa for ailing Mayans. One of the temples erected on Cozumel was dedicated to *Ix Chel*, the Mayan goddess of medicine and fertility. The Mayans believed that Cozumel possessed great recuperative powers for illness and aging, and hundreds of thousands made long pilgrimages to this shrine.

Cozumel also became a major trading center for Mayan seafarers. The Mayans built giant dugout canoes which measured 60 to 80 feet long and were powered by both sail and paddle. The Mayans cruised the entire length of the Central American coastline from Mexico to Panama and conducted a lively trade with other people. Cozumel became a flourishing seaport because of its ideal location and mild climate.

In 1519 the great Spanish explorer, Hernan Cortes arrived at Cozumel with a fleet of 14 galleons. He used the island as his temporary headquarters while explor-

photograph by Geri Murphy



Sightseeing... Cozumel style.

There's one word for diving in Mexico. Clear!

As far as divers are concerned, the end of our land is just the beginning of our land. Because Mexico, beneath the seas, is an incredible world of crystal-clear beauty.

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VIVA COZUMEL!

ing the Yucatan Peninsula and searching for a small group of Spanish explorers who were lost years earlier. Cortes found Cozumel to be an ideal base of operations because the island residents were friendly and there was an ample supply of fresh water and food.

During the 18th and 19th centuries, Cozumel became a victim of an ironical twist of fate. The very same island which had served the Spaniards so well in their early exploration conquests was now being used against them. Cozumel became a pirate stronghold for buccaneers such as Captain Henry Morgan, Captain Jean Lafitte and Old Wooden Leg. Scores of galleons loaded with silver and gold were lost among the treacherous reefs surrounding Cozumel. These sinkings were due to sudden storms or running gun battles at sea. Tales of buried pirate gold and sunken galleons are still whispered among the people of Cozumel, as the island has yet to surrender its treasures.

During the early part of the 20th century, Cozumel remained a sleepy little island with a small fishing village of 3000 people. Approximately 20 years ago the

island was discovered by vacationing travelers who were searching for an off-beat island with a quiet resort atmosphere. Since then, Cozumel has rapidly grown into a flourishing resort community which is now the pride of Mexico's tourism industry. It has become Mexico's most magnificent playground in the sun.

GENERAL DESCRIPTION

If you were not aware of Cozumel's intriguing history, you would swear the island was created purely for tropical vacation pleasure. Tourism is the island's one and only industry, and the people of Cozumel have done a marvelous job of creating a romantic and exciting setting.

Arriving visitors are greeted by a large and impressively modern international airport, which can accommodate commercial jet flights direct from the U.S. or Mexico City. Disembarking passengers quickly pass through Mexican customs and immigration — the facility is seldom crowded.

Cozumel's resort community is virtually a city along the sea. The beachfront hotels and metro area are stretched out along a narrow, ten mile strip of the western shoreline. Even at the center of the city, the metro area is only six blocks wide. A magnificent view of the ocean is just a few steps away from practically any hotel room on the island.

Cozumel has only one major settle-

ment — a town called San Miguel. It covers an area six blocks wide and 20 blocks long and is filled with a fascinating variety of small shops, fine restaurants, and a central square for folk dancing.

Rental cars, jeeps and motor bikes are available for visitors at either the airport, in town, or at many of the larger hotels. Traffic rules are similar to the U.S. and cars are driven on the right hand side of the road. Electrical power for the island comes from a main generator and is 110 volts/60 cycle current which allows visiting divers to safely recharge their underwater lights or strobes.

Cozumel is more than just another island in the Caribbean — it is a state of mind. Most visitors are quickly seduced by the intoxicating atmosphere of this island's casual and friendly lifestyle. Language is not a barrier since most Cozumel residents speak at least a little English and are eager to assist visitors in every way possible. Music is heard almost everywhere, as Mexican mariachi bands frequently play at local restaurants, hotels, and in the town square. The mood is festive and visitors are swept up in the feeling of excitement and celebration.

For Americans, the pace of Cozumel life seems slow. Under the intense Caribbean sun, people seldom hurry. Patience becomes a cherished virtue, whether one is waiting for the dive boat departure or enjoying a leisurely two hour lunch. There is a distinct philosophy of life — slow down and enjoy yourself.

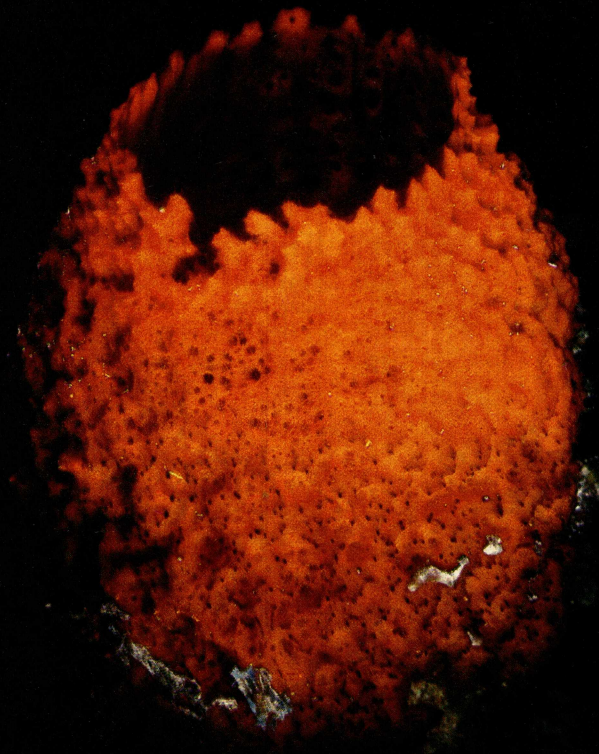
HOTELS

There are now a total of 33 hotels on Cozumel with more being built every year. They can be divided into three major groups located in distinctly separate zones along the leeward shore of the island.

North of town there are a total of seven large luxurious beach hotels situated along the famous San Juan Beach. This area is known as Hotel Row and these luxury style beach hotels are some of the finest to be found anywhere in Mexico. San Juan is a long wide beach with ample room for swimming, sunbathing and sailing. All of these hotels offer luxury accommodations, magnificent swimming pools, and excellent dining facilities.

There are a total of 18 commercial style hotels located within the town limits of San Miguel. While these hotels are not situated on the beach, they do offer the advantage of being within easy walking distance of the town's many restaurants, curio shops, discos and dive shops. The in-town hotels are especially popular among budget conscious divers who prefer not to rent a car and want to be close to the dive shop of their choice.

South of town lies a string of six hotels located along the shore. Most of the coastline of this area is basically iron-



photograph by Geri Murphy

shore with a few small homes and sandy beaches. While the southern hotels do not have a spectacular beach like San Juan, they do have the advantage of being closer to such dive sites as: Palancar Reef, Santa Rosa Wall, and Paraiso Reef. Three of the hotels along this stretch are owned and operated by divers and cater to diving clientele. They are: the Barracuda Hotel, Galapago Inn, and LaCieba Hotel. Also located in this area are two major luxury hotels with private beaches and spectacular accommodations.

For more specific information about Cozumel's hotels, check the Hotel Chart in this supplement.

DIVE SPOTS

Cozumel has long been famous for its superb visibility and sensational drop-offs. It is one of the early cradles of resort vacation diving, having begun development almost 20 years ago. It is here that drift diving became a popular technique for riding the deep ocean currents.

Because of its tremendous undersea variety, Cozumel appeals to divers of all proficiency levels. Experts enjoy the heady thrill of the deep drop-offs; beginners and photographers find stunning beauty among the medium depth reefs; and snorkelers are delightfully entertained by colorful marine tropicals in the shallow coral gardens.

There are literally hundreds of dive spots among the reefs which surround Cozumel. Many of these locations are secret spots known only to certain dive guides and their lucky guests. The following is a sample listing of Cozumel's more popular reefs, but it is by no means complete. It is merely presented as an example of the wide range of dive opportunities which await the diver visiting Cozumel.

DROP-OFFS

Palancar Reef: The reef most identified with Cozumel is actually a conglomeration of many different coral formations stretching for a distance of three miles. It lies about one mile offshore and has such a variety of profiles that it defies description. The north end of Palancar is generally shallow, with the top of the wall starting at 50 feet. The face of the wall is more of a slope than a vertical drop-off. Deeply etched into the face are many winding crevices. It is a labyrinth of passageways, tunnels and caves. The south end of Palancar is considerably deeper and the top of the reef begins at 90 feet. Here you will find majestic coral pinnacles which rise up from the sloping wall. Some of these spires are 60 to 70 feet tall. The best part of Palancar is a spot called Horseshoe. A series of coral heads at the top of the drop-off form a natural horseshoe shape and provide ample opportunities for exquisite underwater photography. Visibility along Palancar Reef ranges from 150 to 200 feet. It is one of

FIESTA COZUMEL HOLIDAYS

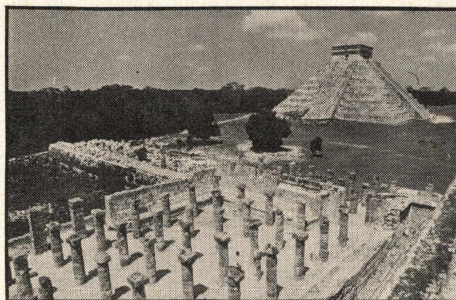
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- Cozumel Caribe
- Cantarell
- Meson San Miguel
- La Ceiba

MAIL TO:

Conchita Ruiz
Cozumel Divers
P.O. Box 16
Cozumel, Q. Roo
Mexico
Tel: 20725

Name _____
Address _____
City _____
State _____ Zip _____
Phone () _____

COZUMEL

DIVE OPERATOR	OWNER/ MANAGER	PHONE	COM- PRESSOR	TANKS	DIVE BOAT/ CAPACITY	DIVE TRIP
1) Deportes Acuaticos Melgar & Calle 8 N. Cozumel, Q. Roo Mexico	Damian Piza Sergio Sandoval	20640	Mako 9.2 cfm	50 alum.	23' Motorsailer/5 divers 28' Yamaha/7 divers	1 tank dive trip 2 tank dive trip lunch included 1 tank night dive
2) Adventuras Tropicales Ave. R. Melgar P.O. Box 34 Cozumel, Q. Roo Mexico	Julio Blanco P.	20393	Worth. 12 cfm	71 steel	36' Motorsailer/15 divers	2 tank dive trip lunch included 1 tank night dive
3) Scuba Cozumel Ave. R. Melgar #13 Cozumel, Q. Roo Mexico	Pedro Delgadillo	20627	Located at the Galapago Inn	Located at the Galapago Inn	Boats located at the Galapago Inn	1 tank dive trip 2 tank dive trip lunch included 1 tank night dive
4) Discover Cozumel Ave. R. Melgar P.O. Box 75 Cozumel, Q. Roo Mexico	Ernesto Vera Kentzler	20280	Mako 9.2 cfm Mako 9.2 cfm	175 alum.	30 Motorsailer/14 divers	2 tank dive trip lunch included
5) Aqua Safari Ave. R. Melgar & Calle 5 S. P.O. Box 41 Cozumel, Q. Roo Mexico	Dick Tompkins	20661 20101	Worth. 15 cfm Worth. 15 cfm	150 alum.	32' Motorsailer/12 divers	2 tank dive trip lunch included
6) Cozumel Divers Ave. R. Melgar P.O. Box 16 Cozumel, Q. Roo Mexico	Conchita Ruiz	20725	Mako 15 cfm	150 mixed	28 Motorsailer/10 divers 22 Mako/6 divers	2 tank fast boat trip 2 tank dive trip lunch included 1 tank dive
7) Dive Cozumel Barracuda Hotel Ave. R. Melgar P.O. Box 163 Cozumel, Q. Roo Mexico	Carlos Sierra	20002	Worth. 20 cfm Worth. 20 cfm	100 alum.	30' Motorsailer/10 divers 24' Hydrodyne/8 divers	2 tank, 1/2 day dive trip 2 tank full day trip lunch included 2 tank, 1/2 day dive trip lunch included 1 tank night dive
8) Galapago Inn South Coastal Road K 1.5 P.O. Box 289 Cozumel, Q. Roo Mexico	Marta Ambros	20663	Worth. 12 cfm Worth. 20 cfm	120 steel	34' Flattop/16 divers 14 Glassbottom/4 divers 22' Aquasport/6 divers	1 tank dive trip 2 tank dive trip lunch included 1 tank night dive
9) Villa Blanca Beach Club South Coastal Road P.O. Box 230 Cozumel, Q. Roo Mexico	Memo & Pilar Arana	20730	Mako 5 cfm	25 alum.	36' Motorsailer/15 divers	2 tank dive trip
10) Fantasia Marina South Coastal Road P.O. Box 176 Cozumel, Q. Roo Mexico	Gabriel Nayar	20700 20215 (eves.)	Worth. 20 cfm	105 mixed	34' Flattop/24 divers 25' Custom/10 divers 14' Custom/3 divers	2 tank dive trip lunch included 1 tank night dive
11) La Ceiba Hotel South Coastal Road P.O. Box 284 Cozumel, Q. Roo Mexico	Pancho Morales	20379	Located at Cozumel Divers downtown store	40 alum.	Beach dives from hotel pier Boats depart from Cozumel Divers	1 tank beach dive including tank & weights 1 tank beach dive with all gear
12) Viajes Y Deportes Del Caribe. El Presidente Hotel South Coastal Road P.O. Box 72 Cozumel, Q. Roo Mexico	Martha Sempere	20322 20290	Mako 5 cfm	60 mixed	27' Motorsailer/15 divers	1 tank dive trip 2 tank dive trip lunch included 2 tank afternoon and night dive
13) El Clavado Chancanab Lagoon P.O. Box 291 Cozumel, Q. Roo Mexico	Bill (Memo) Estenger	None	Located downtown	37 steel	23' Robalo/6 divers	1 tank boat dive 1 tank boat dive 1 tank-boat dive 1 tank beach dive 1 tank beach night dive 1 tank boat night dive
14) Aqua Safari Chancanab Chancanab Lagoon South Coastal Road Cozumel, Q. Roo Mexico	Ramon Zapata	None	Located at Aqua Safari in town	30 alum.	Beach dives only	1 tank beach dive with all gear
15) Rescate Divers Chancanab Lagoon South Coastal Road Cozumel, Q. Roo Mexico	Ernesto Vera Kentzler	None	Located at Discover Cozumel in town	25 alum.	Beach dives only	1 tank beach dive
16) Scuba Adventures Intl. P.O. Box 10 Cozumel, Q. Roo Mexico	Mary Mykolyk	20729 20290 20322	Poseidon 2.7 cfm U.S. Divers 2.7 cfm (portables)	30 mixed	Custom dive tours at Cozumel and Quintana Roo Coast	Custom dive trips

DEPART. TIME	PRICE	DIVE SPOTS	TYPE OF DIVING	INSTRUC- TION	PRICE	HOTELS	U.S. REP.
8:00 am 10:00 am 7:30 pm	\$30.00 \$35.00 \$30.00	Palancar Reef Santa Rosa Wall Paraiso Reef Chancanab Reef	Drop-off & canyons Drop-off 50' coral reef 60' coral reef	2½ hour resort course	\$35.00	La Ceiba Hotel	Sportmen Tours, Inc. P.O. Box 570712 Miami, FL 33157 (305) 253-4391
9:30 am 7:30 pm	\$25.00 \$25.00	Palancar Reef Santa Rosa Reef Paraiso Reef Chancanab Reef	Drop-off & canyons Vertical drop-off 50' coral reef 60' coral reef	3 hour resort course	\$28.00	—	Direct
Anytime 9:30 am 6:00 pm	\$15.00 \$30.00 \$18.00	Palancar Reef Santa Rosa Wall Punta Tormentos Reef Yocab Reef	Drop-off & canyons Vertical drop-off 50' coral reef 30' coral reef	1 day PADI resort course with lunch included	\$50.00	Galapago Inn	Direct
9:30 am	\$25.00	Palancar Reef Maracaibo Reef Santa Rosa Wall Paraiso Reef	Drop-off & canyons Drop-off Vertical drop-off 50' coral reef	3½ hour resort course	\$25.00	Cantarell Hotel Mara Hotel Marques Hotel Barracuda Hotel	William Cheesman 90406 Shadow Drive Springfield, OR 97477 (503) 726-8879
9:30 am	\$29.70	Palancar Reef San Francisco Reef Yocab Reef Paraiso Reef	Drop-off & canyons Drop-off 30' coral reef 50' coral reef	4 hour PADI resort course	\$33.00	La Ceiba Hotel Vista Del Mar Hotel Marques Hotel	Hal Martin Underwater Connection, Inc. 5373 West Alabama Suite 404 Houston, TX 77056 (713) 960-8060
9:30 am 9:30 am 6:00 pm	\$35.00 \$30.00 \$20.00	Palancar Reef Santa Rosa Wall Chancanab Reef Cardona Reef	Drop-off & canyons Vertical drop-off 60' coral reef 45' coral reef	3 hour NASDS resort course 3 hour PADI resort course	\$30.00 \$30.00	Mayan Plaza Hotel Cabanas Del Caribe Hotel Cantarell Hotel Cozumel Caribe Hotel Meson San Miguel Hotel La Ceiba Hotel	Direct
8:00 am 9:30 am 1:00 pm 7:30 pm	\$30.00 \$30.00 \$30.00 \$20.00	Palancar Reef Paraiso Reef Chancanab Reef Barracuda Reef	Drop-off & canyons 50' coral reef 60' coral reef Drop-off	3 hour PADI/NAUI resort course 1 day U/W photo course 1 to 3 day specialty courses	\$30.00 \$50.00 various	Barracuda Hotel Suites Colonial	Don Thompson International Scuba Ventures 1621 Tartar Pasadena, TX 77502 (713) 477-0236 (800) 231-9707
Anytime 9:30 am 6:00 pm	\$15.00 \$30.00 \$18.00	Palancar Reef Columbia Reef Yocab Reef Cardona Reef	Drop-off & canyons Drop-off 30' coral reef 45' coral reef	1 day PADI resort course lunch included	\$50.00	Galapago Inn	Direct
9:30 am	\$25.00	Palancar Reef Santa Rosa Wall Paraiso Reef Yocab Reef	Drop-off & canyons Vertical drop-off 50' coral reef 30' coral reef	1 day PADI resort course lunch included	\$50.00	Villa Blanca	Direct
10:00 am 7:00 pm	\$30.00 \$20.00	Palancar Reef Santa Rosa Wall Maracaibo Reef Paraiso Reef	Drop-off & canyons Vertical drop-off Drop-off 50' coral reef	3 hour PADI resort course	\$30.00	Sol Caribe Hotel Villa Blanca Hotel	Direct
Anytime	\$11.00 \$28.00	North Paraiso Reef Plane Wreck La Ceiba U/W Trail	25' coral reef 33' plane wreck Marked coral trail	2½ hour resort course	\$35.00	La Ceiba Hotel	Direct
10:00 am 10:00 am 2:00 pm	\$15.00 \$30.00 \$20.00	Palancar Reef Santa Rosa Wall Chancanab Reef Paraiso Reef	Drop-off & canyons Vertical drop-off 60' coral reef 50' coral reef	2 hour resort course	\$25.00	El Presidente Hotel Club Med (Cancun)	Direct
10:00 am 12:00 pm 2:00 pm Anytime 7:30 pm 7:30 pm	\$25.00 \$25.00 \$25.00 \$15.00 \$20.00 \$30.00	Chancanab Shore Reef Chancanab Caves Chancanab Heads Palancar Reef Santa Rosa Wall	15' coral ledge 15' coral caves 20' coral heads Drop-off & canyons Vertical drop-off	4 hour PADI resort course	\$35.00	Galapago Inn	Direct
Anytime 9:30 am to 4:00 pm	\$13.50	Chancanab Shore Reef Chancanab Caves Chancanab Heads	15' coral ledge 15' coral caves 20' coral heads	4 hour PADI resort course	\$33.00	La Ceiba Hotel Vista Del Mar Hotel Marques Hotel	Direct
Anytime 9:30 am to 4:00 pm	\$13.50	Chancanab Shore Reef Chancanab Caves Chancanab Heads	15' coral ledge 15' coral caves 20' coral heads	3½ hour resort course	\$25.00	Cantarell Hotel Mara Hotel Marques Hotel Barracuda Hotel	Direct
By appointment only	\$40.00 min	Bahia Espiritu Santo Bahia Tancha Chinchorro Bank Lake Bacalar	Saltwater lagoon Saltwater lagoon Offshore coral atoll Cenotes	8 hour NAUI resort course with beach dive 8 hour NAUI resort course with boat dive	\$40.00 \$50.00	El Presidente Marques Hotel Suites Elizabeth	Louise Mykolik de Brown 2203 Palmer Ave. New Orleans, LA 70118 (601) 928-4703 (601) 794-8196

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For three decades, divers have enjoyed our peaceful island. Challenging majestic Palancar Reef. Experiencing the beauty of Chancanab Lagoon. Or simply worshipping the sun on powder-soft beaches. The hotels of Cozumel can give you the best on a budget, or a luxury experience you'll never forget. Choose from accommodations in the heart of old San Miguel, or a first class resort on miles of white sand beaches.

Each can tailor a dive package to your needs. And in each you'll dine in restaurants with local delicacies and continental cuisine — all served with traditional Mayan hospitality.

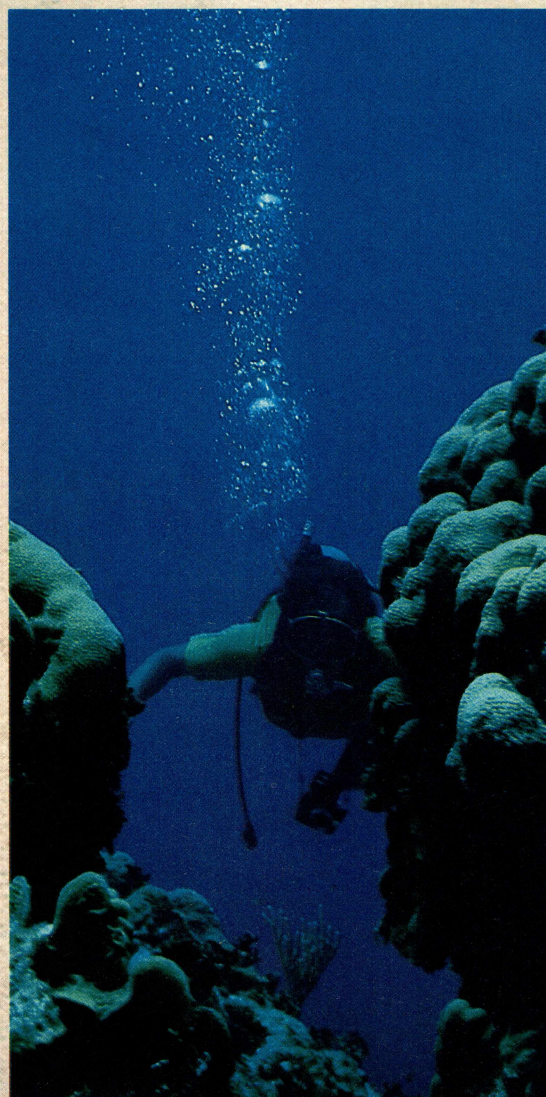
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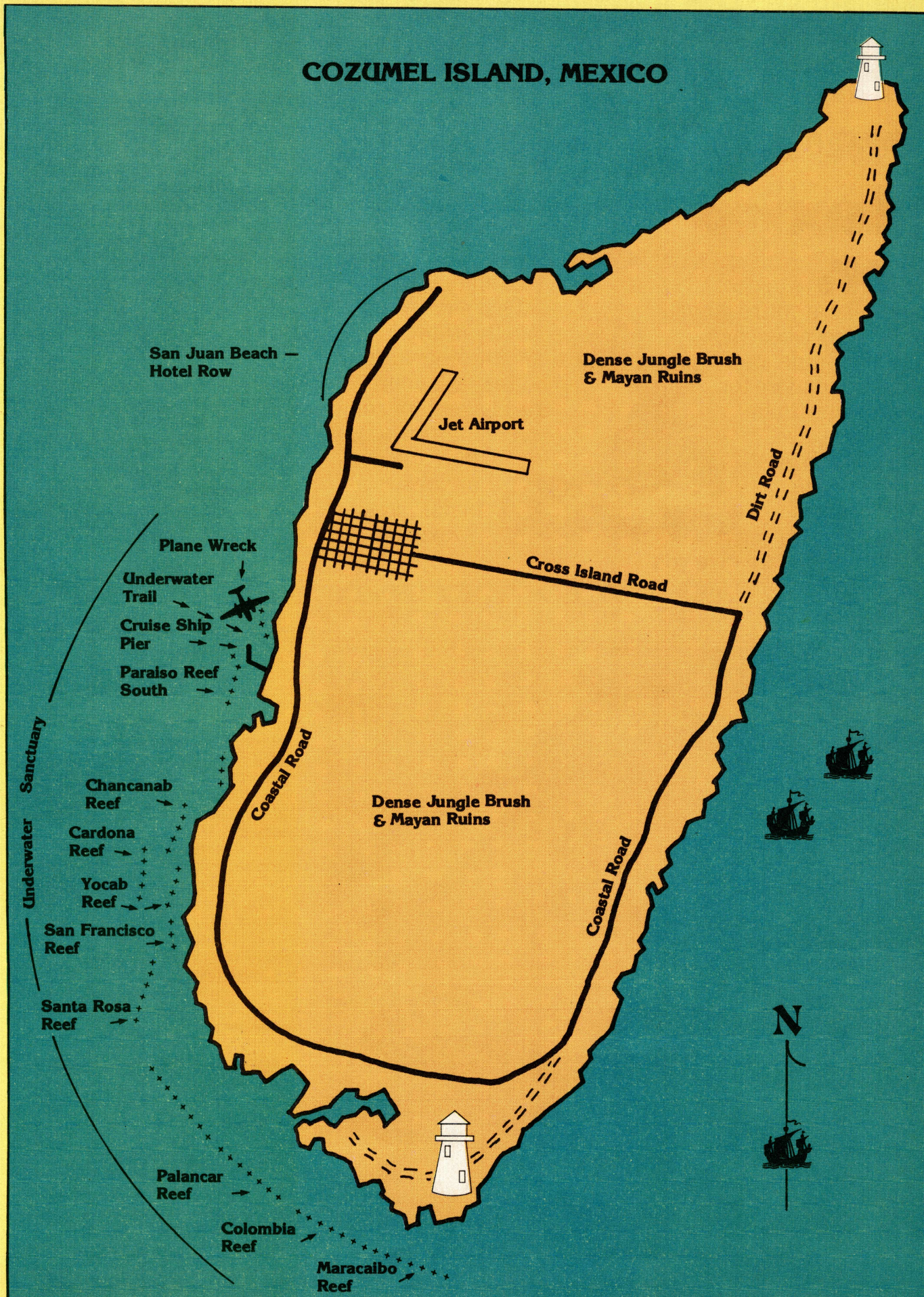
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PLAYA AZUL • SOL CARIBE

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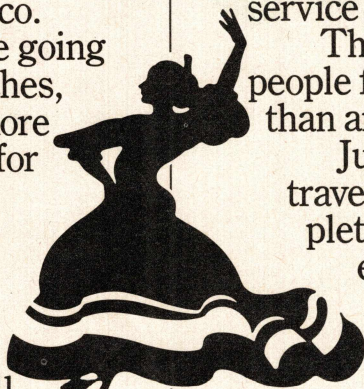
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the most stunning coral reefs in the Caribbean and divers seldom tire of it.

Santa Rosa Wall: Regarded as the second most popular drop-off in Cozumel, this wall begins at 70 feet and drops straight away into the deep. There is always a strong current running here, requiring a drift dive technique. It is a fantastic thrill to fly along the face of this wall and observe schools of jack, graceful eagle rays and an occasional shark. There are huge overhangs of stony corals along the top of the reef and they are beautifully decorated with translucent vase sponges, elegant tube sponges, and other types of colorful sponge growth. This reef is also inhabited by an impressive variety of large queen angelfish and French angelfish.

Columbia Reef: A few miles south of Palancar lies another impressive drop-off known as Columbia Reef. The top ranges from 70 to 90 feet and the quality of diving is as good as Palancar. Here you will find a wide range of coral formations including: Canyons, deep ravines, huge overhangs and tall pinnacles. Small marine life is somewhat sparse but large creatures are frequently seen. It is a good spot for large groupers, giant turtles, and big jacks. Underwater visibility runs from 150 to 200 feet, and there is frequently a current.

Maracaibo Reef: Situated off the southern tip of Cozumel, Maracaibo Reef is considered Cozumel's most challenging and most exciting reef. It is a deep reef with the top of the wall beginning at a depth of 120 feet. There are usually strong currents on the surface and this location is strictly a drift dive. It is a different type of reef than Palancar. The coral formations here are extremely large and there are many caves, tunnels and crevices. This reef is restricted to experienced divers and the dive boats will only make the trip by reservation. Maracaibo is considered high-voltage diving and you can expect almost any type of marine life to appear suddenly.

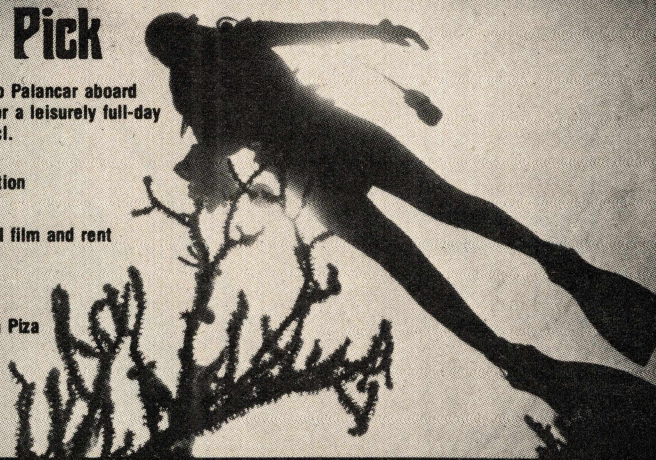
MEDIUM DEPTH REEFS

Paraiso Reef North: There are a series of three inshore reefs which lie just north of the International Pier and run parallel to the shore. They are approximately 200 yards off the beach and can be reached either by boat or from the beach. Dive depths range from 30 to 50 feet and these lovely reefs are loaded with star corals, brain corals, gorgonians, sea fans and sponges. Underwater visibility generally exceeds 100 feet, and there is a slight current which keeps the reef area clean and clear.

Take Your Pick

1. A quick, half-day trip to Palancar aboard our new 28' Yamaha, or a leisurely full-day of diving with lunch incl. We have both choices.
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Paraiso Reef South: Located just south of the International Pier is the continuation of Paraiso Reef. Here the reef is divided into main sections with each one measuring some 500 yards long. Reef life in this area is even more beautiful and the fish life is extremely abundant. This area is slightly further offshore and not dived as frequently as the rest of Paraiso. It is an excellent second spot for the dive boats returning from the deep drop-off. Paraiso Reef is also considered one of the finest sites for night diving activities. This reef really comes alive with strange and exotic marine life then. The average depth is 45 feet.

La Ceiba Reef: A 120 yard long underwater trail has been installed on the reef directly out from La Ceiba Hotel. Starting at the Airplane Wreck the trail is clearly marked with underwater signs which point out specific formations of interest, including: A multi-colored group of sponges; mountainous star coral; a ridge of fire coral; an elegant stand of pillar coral; gorgonian corals; giant brain coral; and others. The trail was established by marine ecologist George Lewbel and photographer Bob Evans. The project was sponsored by Pancho Morales, owner of La Ceiba Hotel. Depths range from 30 to 50 feet.

Tormentos Reef: Directly out from Punta Tormentos and slightly south of Chancanab Reef lies still another medium depth reef. There are an estimated 60 or more high profile coral heads scattered across a sandy bottom in 25 to 35 feet of water. The area is loaded with all types of invertebrates including black crinoids, flamingo tongue shells, arrow-crabs, coral shrimp and sea cucumbers. It is an excellent spot for photography as the current is slight and the heads are adorned with fans, gorgonians and sponges.

Yocab Reef: There is a lovely coral reef approximately 400 yards long which lies a mile south of Punta Tormentos. Dive depths average 30 feet and the coral rises up from the bottom only ten feet or so. It is basically a low profile reef, but loaded with great numbers of queen angelfish and other reef tropicals. Since the reef is fairly close to shore, there is little current and it is an ideal spot for beginning scuba divers. The reef is covered with star corals, brain corals, sponges and seaweeds.

Tunich Reef: There is a slightly deeper reef located directly out from Punta Tunich and about one-half mile south of Yocab. Dive depths at this location range from 50 to 80 feet. The reef is loaded with brain corals, star corals, sponges and seafans. Because there is always a one to one and one-half knot current, the reef is alive with big fish. Jewfish and manta rays are frequently seen and barracuda are always there. It is also a good spot for photographing moray eels.

San Francisco Reef: Located directly out from San Francisco Beach is a one-

quarter mile long coral reef which runs parallel to shore. It is a good one-half mile out and does require the use of a dive boat. Dive depths range from 40 to 55 feet and the fish on this reef are remarkably active.

Plane Wreck: Located 100 yards directly out from La Ceiba Hotel Pier is the wreck of a 40 passenger Convair airliner lying upside down on a white sand bottom. The wreck is situated at the north end of the Paraiso Reef Formations. The plane was purposely sunk in June, 1977 as a prop for the Mexican disaster movie, *Survive II*. Since then the wreck has become a popular dive site for both scuba divers and snorkelers. It is ideal for underwater photography because of the extremely clear water. Although the plane's engines have been removed, the rest of the wreck remains substantially intact.

SNORKELING REEFS

Chancanab Caves: There is a series of fascinating undersea caves located right along the shoreline at Chancanab Lagoon. This is most definitely a beach dive, as the caves actually go back under the shoreline. There are ladders and steps cut into the coral which provide convenient entry into the water and it is hardly more than a few flips of your fins to the nearest cave. Dive depths range from 15 to 35 feet and the caves are generally filled with schools of striped grunt and small snapper. There are also many other types of reef tropicals including sergeant majors, parrotfish and butterfly-fish.

Chancanab Heads: There are several high profile coral heads lying 20 yards offshore at the same location as the caves. Maximum depth here is 28 feet and in some places the coral heads come within 14 feet of the surface. These high coral heads are covered with gorgonians, seafans, and other types of small marine life. There is always a school of striped grunt and mahogany snapper huddled together at the base. This location is ideal for both snorkelers and beginning scuba divers. Visibility generally exceeds 100 feet.

Galapago Reef: The ironshore directly in front of the Galapago Inn is a favorite snorkeling spot for early morning swims and late afternoon dives after the boat returns from the drop-offs. Depths range from 8 to 12 feet and most of the marine life is concentrated right up against the shoreline. It is a fascinating area for observing small marine tropicals and macro invertebrates which inhabit the crevices and small corals in this area. The dive area stretches for more than 100 yards and there is easy access from the hotel pier.

Barracuda Reef: The ironshore area directly in front of the Barracuda Hotel is a popular snorkeling area for hotel guests and divers who are eager to squeeze in a little extra diving time. The

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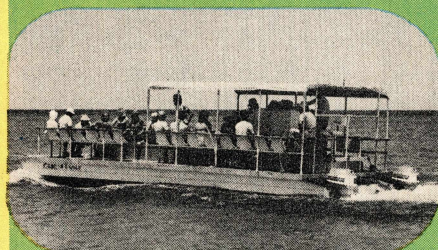
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shoreline in this area is quite irregular, with many small cracks, crevices and undercuts. Depths range from 8 to 12 feet and there is a nice assortment of small marine tropicals and macro creatures. Access to this snorkeling area is via a set of cement stairs which descend into the water right in front of the hotel.

La Ceiba Shallows: Located directly in front of La Ceiba Hotel is a group of shallow coral heads and a reef just prior to the beginning of the Underwater Trail. Depths range from 12 to 20 feet, and the reef offers a fine variety of brain corals, gorgonians and sponges. This area is abundant with small marine tropicals and invertebrates of all types. Access to this reef is directly from La Ceiba Hotel Pier.

Other Side: There are many lovely coral reefs for snorkeling on the eastern shore of Cozumel, directly across the island from town and the hotel. This is the wild and undeveloped shoreline which faces the open sea and normal trade winds. Unfortunately, the diving along this section of coastline cannot be guaranteed as it is frequently wiped out by strong winds and heavy surf conditions. This area should only be dived when the sea is absolutely calm and surge conditions are at a minimum. The best way to obtain reliable information about dive conditions along this shoreline is to inquire at Cozumel's various dive shops.

UNDERWATER SANCTUARY

In the past few years government officials and Cozumel's dive community have become concerned over the possible deterioration of their beautiful reefs. The increasing number of visitors has exerted a growing environmental impact as eager tourists seek to bring home a souvenir from their reef dives. The government has now taken positive steps to preserve the marvelous marine life which flourishes along Cozumel's coral reefs and drop-offs. A 15 mile section of reefs has been declared Cozumel's Underwater Sanctuary.

The Underwater Sanctuary encompasses an area from the cruise ship dock (next to La Ceiba Hotel) southward to Punta Celarain at the very southern tip of the island. The width of this sanctuary extends from the shoreline to deep water beyond the edge of the drop-off and includes anything which grows along the vertical face of the drop-off or any underwater cave which might extend back under the shoreline. In essence, the new Underwater Sanctuary encompasses

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just about all of the best drop-offs and medium depth reefs described in this supplement.

It is now against Mexican law to spearfish or take any type of marine life which may be living within the boundaries of the newly proclaimed Underwater Sanctuary. Regulations prohibit the taking of any type of corals (including black coral), live shells, turtles, crabs, lobsters, starfish, seafans, sponges, or other types of marine life. The use of, or presence of, spearguns within the Underwater Sanctuary area is strictly forbidden.

Violators of sanctuary regulations are subject to heavy fines, possible jail terms, and confiscation of any equipment which was used in the violation of these laws. Confiscation could include even the boat from which such unlawful dives were made. These laws are administered and enforced by the Mexican Office of Fisheries, as well as Cozumel Municipal authorities.

DIVE OPERATORS

Cozumel has an amazing variety of dive operators, the number of which has grown in the past five years. At last count there was a total of 16 different enterprises providing an impressive array of services and facilities. If you are willing to search for it, you will find the dive service which precisely fits your needs.

The chart in this guide provides all the technical data describing each dive operator's specific facilities and services. At one quick glance you can compare departure times, size of dive boats, trip prices, or find a local telephone number. In addition, we would like to provide you with a brief description of each operation.

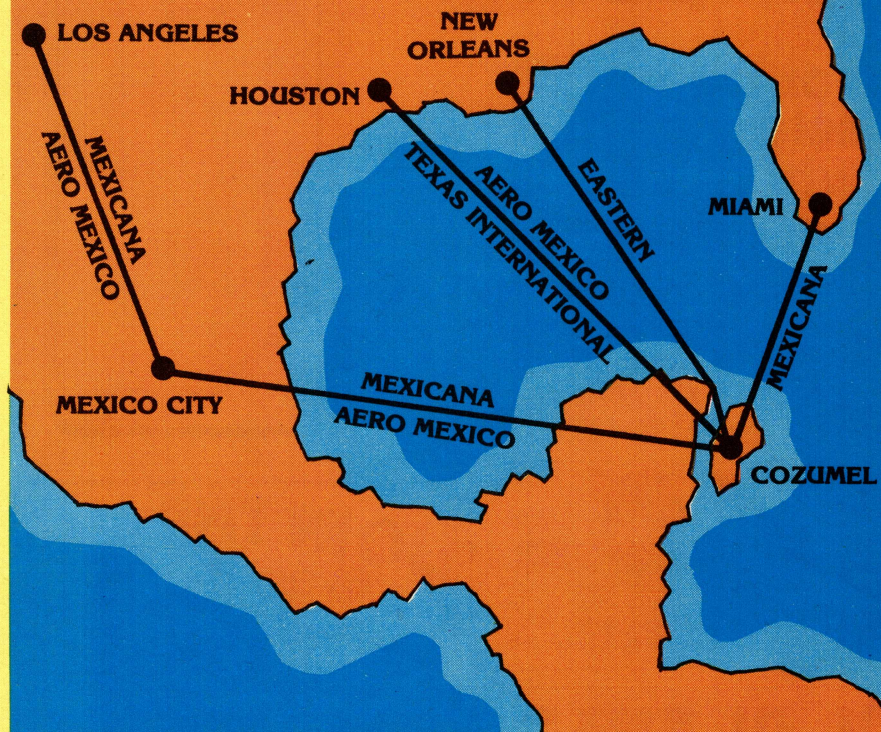
1) Deportes Acuaticos: Located at the north end of town, part way down a side street, is a small but neat retail dive store. The store has been open for two years and offers a limited selection of dive equipment, T-shirts and swimsuits. The store is owned and operated by Damian Piza. Damian has been diving for 35 years and is a former swimming champion.

2) Aventuras Tropicales: This is a small one-man dive charter service owned and operated by Julio Blanco. His booking office is located right in the center of town, directly across the street from the town pier. Julio provides personalized service aboard his 36 foot motor sailer.

3) Scuba Cozumel: Located a block or two south of the town pier this operation is basically a dive charter service owned and operated by Pedro Delgadillo, the same man who operates the Galapago Inn. This store provides both resort scuba instruction and daily dive trips to the reef for groups and individuals who are staying at one of the many hotels in town.

4) Discover Cozumel: Barely a block

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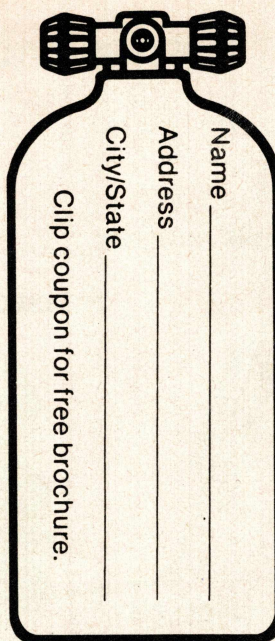
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down the street is a full service dive store which offers dive equipment, air fills, tank rentals and regulator repair. This store is owned and operated by Ernesto Kentzler, a Mexican certified scuba instructor. Ernesto offers daily dive charters and does a considerable amount of business with groups and clubs.

5) Aqua Safari: Also located on the coastal road toward the south end of town is one of Cozumel's largest dive operators. Aqua Safari is a full service dive shop which offers equipment sales, air fills, regulator repair, scuba classes and daily dive trips. This shop is owned and operated by Dick Tompkins, one of the few American dive operators on Cozumel. Dick has lived in Mexico for 34 years and has spent the last six years in Cozumel. Aqua Safari dive boats depart from a pier directly across the street from the dive shop.

6) Cozumel Divers: Basically a dive charter service, this operation is owned by a consortium of six hotels on Cozumel. Located right on the water at the south end of town, this shop has dive boat docking facilities directly in front of the building. This shop has a staff of seven divers at the downtown store plus six more who manage satellite booking offices at each of the hotels involved.

7) Dive Cozumel: The Barracuda is one of several hotels on Cozumel which has a complete dive charter service on the premises, known as Dive Cozumel. The hotel is located just south of town right at the water's edge. The shop is owned and operated by Carlos Sierra, a certified YMCA instructor who began diving in Colombia, South America. This dive operation offers special half-day dive trips aboard a dive boat which can reach Palancar Reef in 45 minutes.

8) Galapago Inn: Located on the coastal road one-half mile south of the Barracuda Hotel is a full service dive hotel built by Pedro and Maria Delgadillo. These delightful people have been diving for 11 years and came to Cozumel in 1977 to construct the ideal dive resort. Scuba facilities are located in a small building close to the water and include air compressor, dive gear storage, scuba classroom, rinsing facilities, and lockers for the guests. It is a full service resort and 100 percent of the hotel guests are divers. The operation is also a PADI training facility and has already hosted one instructor training course, with another to be scheduled shortly.

9) Villa Blanca Dive Club: The Villa Blanca Hotel has recently established its own dive program in order to solicit a diving clientele for its hotel. They are starting

with a modest inventory of a small air compressor, one dozen rental tanks and a modest assortment of snorkeling equipment. Diving trips and scuba instruction are booked through the services of the Galapago Inn.

10) Fantasia Marine: One-half mile farther south along the coastal road is a dive charter service located directly in front of the Sol Caribe Hotel. This operation is owned by Eduardo Lopez of Mexico City and is managed by Gabriel Nayar, a certified YMCA instructor with 15 years of underwater experience. This operation has only been in existence for over a year and is doing a lively business. Its pride and joy is a 34 foot Flattop powered by twin 115 hp Evinrude motors.

11) La Ceiba Hotel: A little more than three years old, La Ceiba Hotel is a fine beach hotel which caters to watersports enthusiasts as well as divers. It is operated by Pancho Morales, a veteran diver with 20 years of experience. La Ceiba is located almost next door to Fantasia Marina and offers excellent snorkeling, beach diving and daily boat trips. The dive boat loads passengers right at La Ceiba Pier. An innovator in resort development, Pancho has established an underwater trail on the coral reefs directly in front of the hotel. Plastic undersea plaques identify the various corals, sponges and marine life which are prominent along a 120 yard section of the reef.

12) Viajes y Deportes del Caribe: Located on the grounds of the prestigious El Presidente Hotel, this dive charter service caters primarily to hotel guests. It is part of a complete tour business which involves side trips to Tulum, beach picnics, Chichen Itza tours and so on. The business is owned and operated by Martha Sempere, a certified diver who rarely has time to dive because of her business. Martha has a staff of three divers who are involved in renting snorkeling gear and conducting dive trips.

13) El Clavado: Located right at Chancanab Lagoon, El Clavado is one of three small shops which offer daily scuba lessons, tank rentals and rental of snorkeling equipment. This operation is owned and managed by Memo Estenger, a certified PADI instructor who has been diving in Cozumel for three years and speaks fluent English. Located just a few steps from the water's edge, Memo provides convenient and easy resort dive instruction.

14) Aqua Safari Chancanab: Also located at Chancanab Lagoon is Aqua Safari's satellite dive operation. This operation specializes in resort scuba lessons for tourists as well as beach dives and photo dives for experienced divers. The shop is managed by Ramon Zapata, one of Cozumel's first and best known professional underwater guides.

15) Rescate Divers: The third in the trio of dive shops at Chancanab Lagoon is a satellite dive operation managed by

COZUMEL HOTELS

	HOTEL	COZUMEL PHONE #	# OF ROOMS	SWIM POOL	ON BEACH	AIR-COND.
NORTH ZONE:	1) MAYAN PLAZA	2-0411	94	yes	yes	yes
	2) EL COZUMELENO	2-0344	82	yes	yes	yes
	3) CABANAS DEL CARIBE	2-0072	61	yes	yes	yes
	4) PLAYA AZUL	2-0199	64	yes	yes	yes
	5) COZUMEL CARIBE	2-0100	248	yes	yes	yes
	6) CANTARELL	2-0144	110	yes	yes	yes
	7) MARA	2-0300	48	yes	yes	yes
IN TOWN:	8) PARAISO CARIBE	2-0740	41	no	no	yes
	9) POSADA COZUMEL	2-0314	19	yes	no	yes
	10) BUNGALOWS CANDELA	2-0179	10	yes	no	yes
	11) MESON SAN MIGUEL	2-0233	97	yes	no	yes
	12) LOPEZ	2-0108	34	no	no	yes
	13) YOLI	2-0024	10	no	no	fans
	14) POSADA LETTY	2-0257	10	no	no	fans
	15) MAR Y CARMEN	2-0581	27	no	no	yes
	16) MARQUES HOTEL	2-0537	27	yes	no	yes
	17) EL PIRATA	2-0051	21	no	no	yes
	18) SUITES COLONIAL	2-0506	28	no	no	yes
	19) BUNGALOWS PEPITAS	2-0098	20	no	no	yes
	20) SUITES ELIZABETH	2-0330	19	no	no	yes
	21) FLORES	2-0164	10	no	no	fans
	22) BAHIA	2-0209	21	no	harbor	yes
SOUTH ZONE:	23) AGUILAR	2-0307	32	yes	no	yes
	24) MAYA COZUMEL	2-0011	27	yes	no	yes
	25) VISTA DEL MAR	2-0545	21	no	harbor	yes
	26) BARRACUDA	2-0002	31	no	yes	yes
	27) GALAPAGO INN	2-0663	23	no	yes	yes
OTHER SIDE:	28) LA PERLA	N/A	21	no	yes	yes
	29) VILLA BLANCA	2-0730	14	no	yes	yes
	30) SOL CARIBE	2-0700	220	yes	yes	yes
	31) LA CEIBA	2-0379	42	yes	yes	yes
	32) EL PRESIDENTE	2-0322	192	yes	yes	yes
	33) MOTEL PUNTA MORENA	2-0159	6	no	yes	yes



Ernesto Kentzler who also operates Discover Cozumel. This dive shop was started in May, 1978, specifically to provide a source of income to help pay for the equipment and administrative expenses of Cozumel's Rescue Unit. The dive shop is equipped with three radios and is located in an ideal spot for communicating with dive boats anchored at Palancar Reef as well as medical services in town. This modest dive shop of-

fers resort course instruction for tourists as well as scuba rentals for beach dives.

16) Scuba Adventures International: Owned and operated by Mary Mykolyk, this independent dive guide service provides strictly customized services for expeditions and specialized dive tours. It is a one-woman operation with offices in New Orleans. She specializes in dive tours to some of the more primitive areas of the Yucatan coast, including trips to

VIVA COZUMEL!

blue hole caves, freshwater lakes, and Chinchorro Bank. Mary serves as expedition coordinator for such trips with price quotes upon request.

RECOMPRESSION CHAMBER

Because of the tremendous influx of diving visitors, the Cozumel dive operators and municipal authorities felt it would be helpful to install a recompression chamber on the island. A fully equipped double-locked treatment chamber has been installed at the Cozumel Hospital close to town. It is under the supervision of two medical physicians located at the hospital. They have received special training in hyperbaric medical procedures as well as emergency treatment of bends cases.

An annual training program is conducted at the recompression site and most all of Cozumel's dive instructors and underwater guides are now fully ac-

quainted with emergency treatment procedures.

HOW TO GET THERE

One of the major contributing factors to Cozumel's success as a popular dive destination is this island's excellent air service. Cozumel is served by four international air carriers who provide direct or connecting service from the U.S. They are: Aeromexico, Mexicana Airlines, Texas International, and Eastern Airlines. All four provide modern jet service.

There are four basic gateways in the southern part of the U.S. where you can board a jet headed for Cozumel. They are: Miami, New Orleans, Houston and Los Angeles. In addition, there are direct flights from Mexico City, which serves as the major gateway for connecting international flights from all parts of the world.

If you live in the eastern or southern part of the U.S. your best connection is via the Miami gateway. Mexicana Airlines offers daily non-stop service in the early afternoon. The flight takes approximately one and one-half hours, as Cozumel is only 554 miles from Miami.

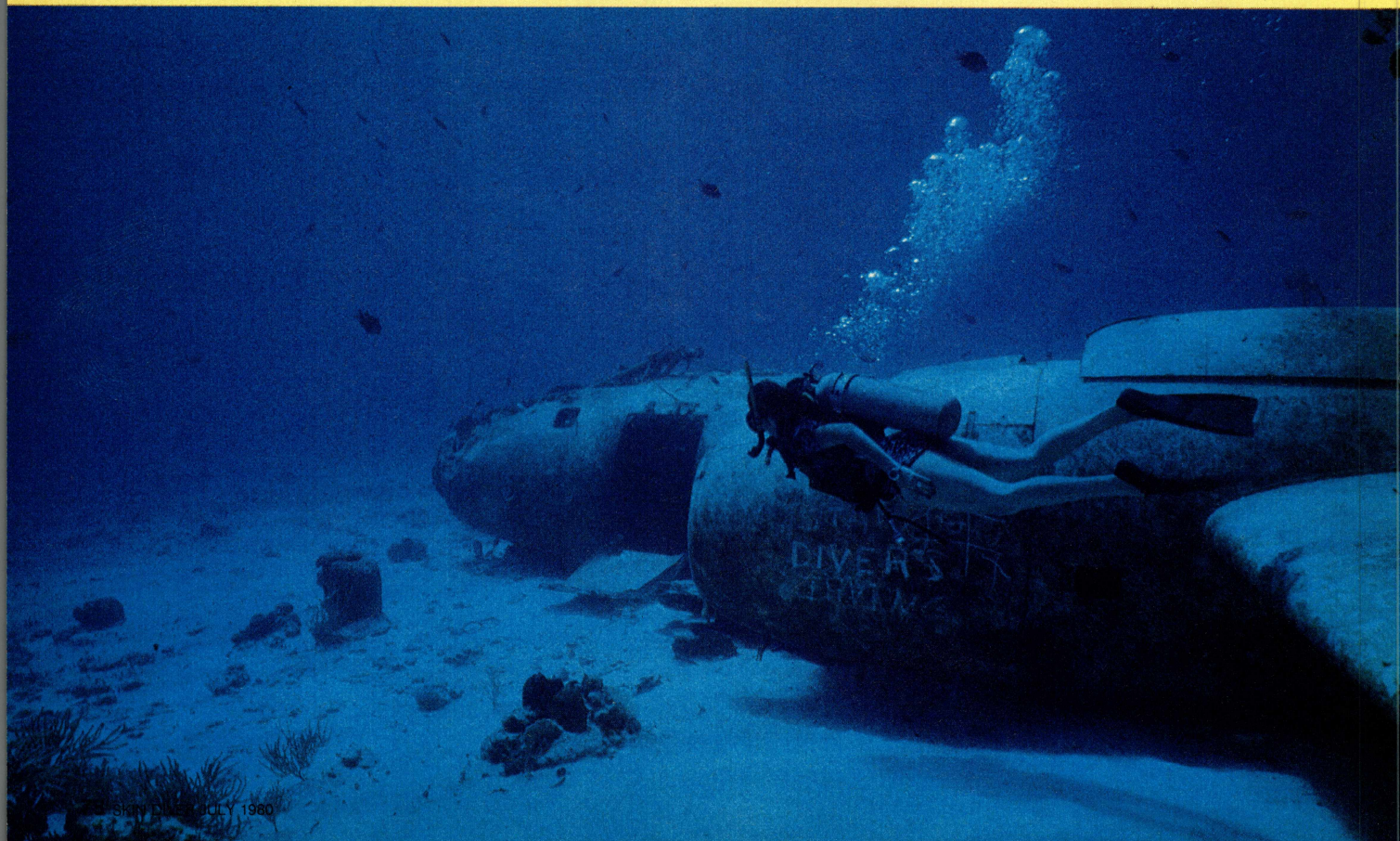
Divers living in the Midwest will find the Houston gateway to be their most convenient connection. Both Aeromexico and Texas International operate daily non-stop flights from Houston to Cozumel. The trip takes approximately two

hours; Cozumel is almost 800 miles from Houston.

Should you have difficulty obtaining a reservation on the Houston flight, you might want to consider departing from New Orleans instead. Eastern Airlines offers direct jet service from New Orleans to Cozumel on Saturdays and Sundays only, with one stop at Cancun. This flight takes approximately three hours and 45 minutes because of the stopover connection.

Divers living on the West Coast will find the Los Angeles gateway the most convenient. While there are no direct flights from Los Angeles to Cozumel, Mexicana Airlines offers excellent connections via Mexico City. There are at least two flights daily which offer good connections with less than a two hour layover. The entire trip from Los Angeles to Cozumel generally takes seven and one-half to eight hours.

Should the flights from Mexico City be booked solid, an alternate route would be a flight from Los Angeles to Houston with a continuing connection to Cozumel. The departure from Los Angeles would have to be an early flight in the morning in order to make Aeromexico's late afternoon departure. This routing is more expensive than a flight via Mexico City, but you can still make the entire journey in one day. ➤



SDM travel SECTION

Puerto Rico, also known as the Enchanted Island, is the smallest of the Greater Antilles. Famous for its night life and beautiful women, it is considered the Caribbean island with the most economic development. This island is visited by more than 2,000,000 tourists annually, most of whom stay in the metropolitan area of San Juan. Unfortunately, the best dive sites are located far away from San Juan. But, there are waters as crystal clear as those of the Virgin Islands and the temperatures are no lower than 81°F. The islands of Vieques and Culebra to the east and Mona and Monito to the west are examples of this; all have great visibility even during offseasons.

Puerto Rico is surrounded by many beautiful, white sand beaches. A few of these have been turned into public beaches where diving is prohibited. Fortunately, this is not the case along two of the most exotic ones on the northwest coast, Crash Boat and Bajura. Here you can find all kinds of diving including pier, reef and cave.

Crash Boat is a pier located in the town of Aguadilla. It is separated from Bajura by what used to be Ramey Air Force Base. The pier is one of the most exciting in the Caribbean, with over 250 pilings organized in a T-shape along one of the best beaches in Puerto Rico. Visibility is excellent, sometimes reaching 100 feet just 70 yards from shore. The pier is perfect for macro and wide-angle photography; the pilings are covered with colorful Christmas tree worms, delicate arrowcrabs, large basket and tube sponges, many curious spotted morays and some friendly seahorses. It's not unusual to find schools of small jacks, sardines and grunts wandering around in-between the pilings. You can also see solitary angels, jackknives, octopus and scorpionfish, and the ever faithful companionship of trumpetfish. In addition to all this natural beauty there are a series of artificial reefs close to the pier at depths from 85 to 110 feet, complete with many diverse marine species.

Crash Boat is as amazing now as it has

PUERTO RICO BEACH DIVING

TEXT AND PHOTOGRAPHY
BY JOSE L. ARBONA



been throughout history. For 200 years, Crash Boat was an isolated fishing village which only had sea access. In 1939, Ramey Air Force Base was finished one mile north of the beach. At one time over 500 active divers on the base formed the Ramey Sea Lancers, one of the largest dive clubs in the world. During wartime, this beach witnessed some tragic accidents, for it was here that damaged planes had to land in the water so the runway wouldn't be ruined for other aircraft. Because boats went out to rescue pilots and crew, Crash Boat got its name.

Crash Boat's pier was only constructed to supply the base with fuel. Originally the pier was built at a depth of 15 to 55 feet, but there have been ecological changes during the last decade (sand flow) reducing the depth of the pier to some 30 feet. It is not used commercially, so Crash Boat has no traffic. This gives it a big advantage over other piers of the Caribbean.

Following the same road that takes one to Crash Boat, we find Bajura one mile east of Ramey, just beyond the town of Isabel. Due to its location in front of a cliff, Bajura is not as popular as Crash Boat. This setting, however, makes the site more esthetically appealing. In addition, hundreds of palm trees decorate it and provide shade for the sand dunes covering the one-half mile of beach.

The first few meters offshore are characterized by isolated coral formations

leading to a depression at about ten feet. Here you will find an entrance big enough for a diver to slip through a passageway leading to a pool at 20 feet. The bottom of the pool is formed by irregular sand scales which are surrounded by openings pointing to the entrances of huge caves. The sun rays shine weakly through the coral-formed roof, giving the cave life, color and beauty. Currents play an important part in the visibility, making it vary from 20 to 60 feet depending on the time of the year. All these labyrinths form a ring of 50 meters, of which only a few mark the way to open sea or back to shore. Along the outside part of the ring the visibility is greater and the sand changes from soft and grainy, to ground shells. Caves here, fewer in number and smaller in size, give way to a coral reef in the form of channels with seafans.

Marine life is very special in Bajura. If you have good luck you may see a small sweeper and a giant manatee in a single dive. This herbivorous mammal, also known as a sea cow, is completely aquatic and roves the caves. In the caves you will find groupers, snappers, squids, parrotfish, grunts, some barracuda and an unending list of exotic marine life which contribute to this astonishing dive site.

All tourist facilities are located on the grounds of Punta Borinquen. This giant tourist center came into being when Ramey ceased its activity as a SAC (Strategic Air Command) base in 1974. The complex has its own airport with direct flights from Canada and Florida, bringing thousands of tourists annually. Punta Borinquen possesses a villa which provides lodging for all visitors during their stay. The center has many facilities for daytime and nighttime activities, including eight tennis courts, an 18 hole golf course, a bowling alley with six lanes, horseback riding and some night spots for dancing. Punta Borinquen also has a pretty, sandy beach which is one of its principal attractions. For the diver, there are a few dive shops at each location, ready to supply everything needed for an exciting experience. 🐠

United States Virgin Islands

Photo: Bret Gilliam, V.I. Divers, Ltd.



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Above & Below, 12 Strand Street,
Frederiksted 00840. Tel.: (809) 772-3701
Caribbean Sea Adventures, Kings Wharf,
Christiansted 00820. Tel.: (809) 773-6011

North Star Dive Tours, Box 3461,
Christiansted 00820. Tel.: (809) 778-2125
Pressure Ltd., Box 3612,
Christiansted 00820. Tel.: (809) 77-DIVER

Salty Dogs Inc., 59 Kings Wharf,
Christiansted 00820. Tel.: (809) 773-2678

V.I. Divers, Ltd., PanAm Pavilion,
Christiansted 00820. Tel.: (809) 773-6045

St. John: (Zip Code 00830)

Scuba Ventures, Caneel Bay Plantation,
Tel.: (809) 776-6111

St. John Watersports, Box 70,
Cruz Bay, Tel.: (809) 776-6256

St. Thomas: (Zip Code 00801)

Aqua Action Inc., Wintberg Peak,
Tel.: (809) 775-3275

Bolongo Bay Beach & Dive Club,
Box 3381, Tel.: (809) 775-1800

Caribbean Divers, Red Hook,
Tel.: (809) 775-1935

Ocean Adventures at Bolongo Bay,
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St. Thomas Diving Club, Box 4976,
Tel.: (809) 774-1376

Virgin Islands Diving School, Box 9707,
Tel.: (809) 774-8687

Joe Vogel Diving Company, Box 7322,
Tel.: (809) 774-2321

Watersports Center, Box 2432,
Tel.: (809) 775-0755

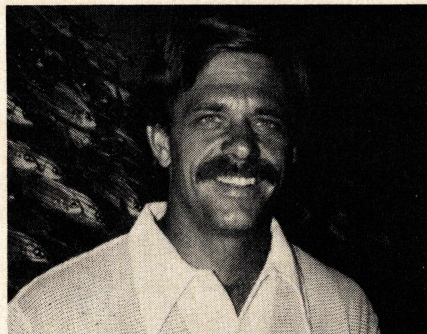
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P.O. Box 523850, Miami, Florida 33152

SCHUSTER TO VIRGIN ISLANDS

Gerry Schuster has recently joined Virgin Islands Diving Schools as manager. Gerry taught for Virgin Islands Diving Schools in 1978-79 and holds instructor



ratings with PADI, NAUI, SSI, and Los Angeles County. Virgin Islands Diving Schools offers tours and classes for beginners through instructor, as well as seven specialty courses. For information write: Virgin Islands Diving Schools/Supplies, Inc., P.O. Box 9707, St. Thomas, Virgin Islands 00801.

MOORE TOURS CAYMAN TRIP

New reduced fare trips to Grand Cayman Island are now offered through Moore Tours, along with an expanded land package. The new land offerings include a deluxe condominium apartment complex plus another hotel choice. Responding to the growing popularity of vacationing at Grand Cayman, the additional non-stop "owly-bird" jet service via Cayman Airways is scheduled to depart from Houston each Saturday and Sunday at approximately 11:30 pm. The new late night reduced fare flights for Moore Tours groups are expected to save travelers an estimated \$80 per person over the cost of individual booking on a seven-night package. Information on this and other dive packages is available from Moore Tours, Box 7450, Dallas, TX 75209.

DIVERS' WORLD FREETIME

Divers' World of Key Largo has a new, 33 foot custom-built dive boat, *Freetime*. Owned and operated by Captain Corky Toth, *Freetime* makes reef tours for divers and snorkelers at 9 am and 1 pm daily. Captain Toth runs trips into Pennekamp Park for sightseeing and U/W photography, and out of the park for unique shell collecting treks.

Freetime is U.S. Coast Guard certified to carry 18 passengers and Diver's World offers group rates for dive clubs and families. For further information contact Divers' World, P.O. Box 1663, Key Largo, FL 33037.

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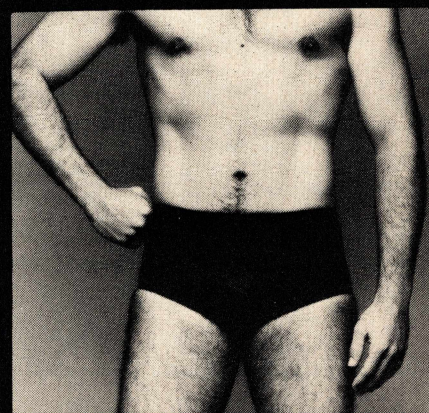
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DIVE BONAIRE'S BOAT

Peter and Alice Hughes have added the *SeeScape* to their fleet of five boats on Bonaire. *SeeScape* is a 32 foot glass bottom boat powered by two, 90hp outboard motors. *SeeScape* can accompany the dive boats to all the popular



dive spots along the coast of Bonaire and around Klein Bonaire, giving nondiving members of families and groups the opportunity to experience some of Bonaire's magnificent underwater scenery. *SeeScape* also operates as a backup dive boat for the company.

For information contact: Dive Bonaire/Flamingo Beach Hotel, P.O. Box 686, Ithaca, NY 14850. 🐠

SEA OF CORTEZ

NAUI will host an eight day Sea of Cortez dive, July 26-August 2. The cost will be \$695. Write: Baja Expeditions, P.O. Box 3725, San Diego, CA 92103, or call (714) 297-0506. 🐠

SEAVENTURES SCUBAMP

SeaVentures International recently installed a new Haskel Scubamp on the *Impossible Dream* that allows tanks to be filled to their maximum rated pressure in less time. In addition, the *Impossible Dream* has two new divemasters with PADI instructor ratings: Julius B. Wiggins Jr. from Miami, FL, and James W. Bobb from Melbourne, FL. James Bobb is also a certified open water instructor for NAUI, and both instructors carry advanced ratings for first aid, CPR, equipment specialist, rescue diver, river diver, search and recovery and U/W photography. For information contact SeaVentures Int'l. Inc., P.O. Box 3271, Indianalantic, FL 32903. 🐠

CAYMAN BRAC

Cayman Airways has 14 flights a week to Cayman Brac from Grand Cayman, and eight flights a week from Grand Cayman to Little Cayman. Convenient international connections can be made with flights to Grand Cayman from Houston

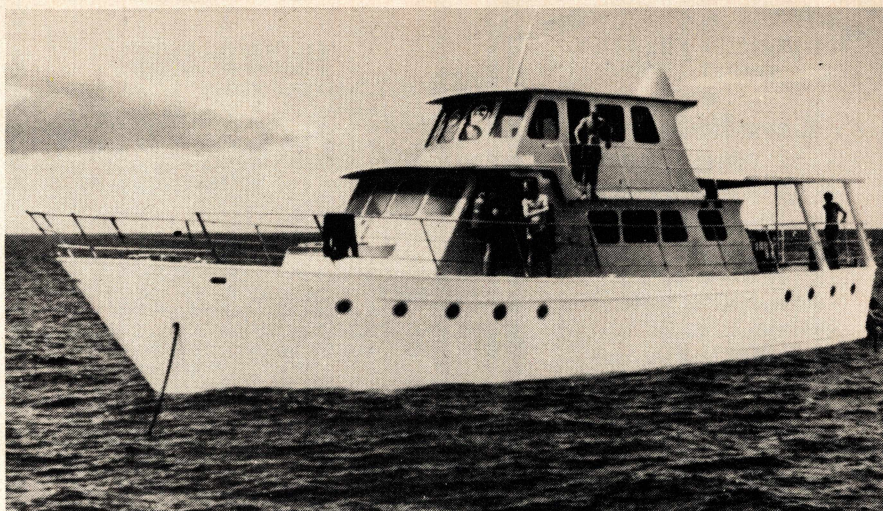
and Miami on Cayman Airways, from Miami and Fort Lauderdale on Republic Airlines and from Miami via LACSA. Red Carpet Airlines has several flights weekly from Grand Cayman to Cayman Brac and four flights weekly between Cayman Brac and St. Petersburg, Florida.

Where to stay on Cayman Brac: Buccaneer's Inn, Box 68, Cayman Brac, B.W.I. Vacation and dive packages available. Brac Reef Hotel, Cayman Brac, B.W.I. Vacation and dive packages available. Coral Isle Lodge, Cayman Brac, B.W.I. Daily rates, diving available at Brac Reef Hotel. 🐠

NEW JERSEY DIVE PACKAGE

New Jersey has something new for out of state divers: A dive package. Corsair Divers Club in conjunction with the Holiday Inn North, at Newark International Airport, is offering weekend packages for this season. The package includes: Two or three nights at the Holiday Inn; transportation to and from the marinas and dive sites; and boat rides to wrecks on Coast Guard certified vessels.

The two day package is \$130 (double-occupancy), and the three day package with night diving is \$210. For more information write Corsair Divers, % Holiday Inn North, 160 Holiday Plaza, Newark, NJ 07114. 🐠



AUSTRALIA'S REEF EXPLORER

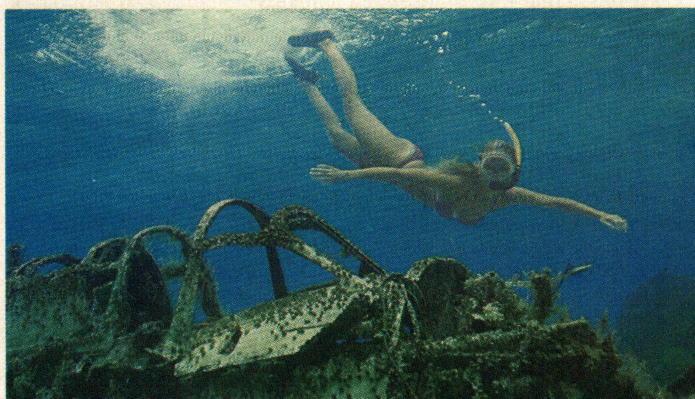
Dive in Australia has launched the *MV/ Reef Explorer*, which will serve the Coral Sea. With its 60 foot length, the *Reef Explorer* easily accommodates the 12 passengers and four crew for which it is licensed. Sleeping accommodations consist of six double cabins convertible to twins, and three single aft cabins; all complete with hand basins, water and vanity; two toilets and showers are located downstairs, and there are rinse showers on deck. The recreational area

consists of a salon/bar, video tape facilities, 24 hour kitchen and bar, all fully air-conditioned. For information write: Twin Fin Dive Tours, 475 17th Street, Suite 744, Denver, CO 80202. 🐠

SEE & SEA TO FIJI

See & Sea Travel has announced a 17 day dive program to the exotic South Pacific islands of Fiji. Departing August 8 and returning August 23, the tour will be escorted by well-known U/W photographer Chris Newbert. Contact See & Sea Travel. 🐠

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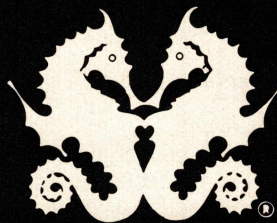
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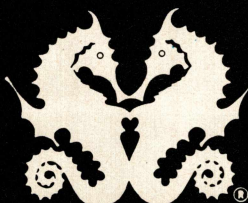
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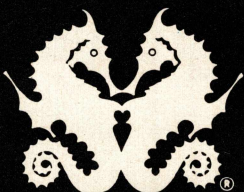
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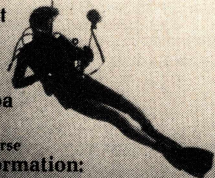
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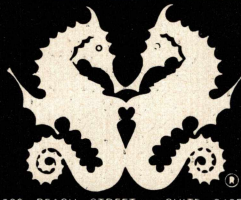
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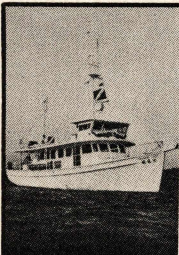


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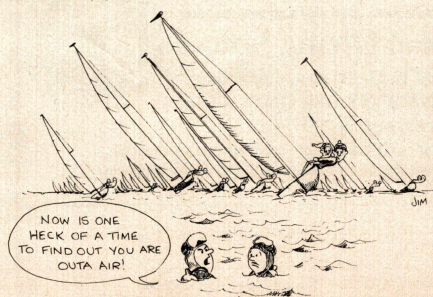
BONAIRE'S REEF MANAGEMENT

At the first light of dawn on February 23, 1980, a mammoth cooperative effort in Bonaire's reef management program got underway. The project was the installation of 13 permanent moorings, weighing in excess of 2000 lbs each, at the most popular and frequently visited dive sites around the 1500 acre island of Klein (small) Bonaire. This island lies a short distance off the west coast of Bonaire.

The equipment involved was worth close to 3.5 million dollars and consisted of the 200 foot crane barge, *Skerchi*, and accompanying small tug boat, *Tribon*, which are owned and operated by the international marine contracting company, Harborworks N.V. based in Curacao. Also involved was the 4000 hp tug boat, *Krabe*, which is owned by the Bonaire Petroleum Corporation and operated by Bonaire Marine Services N.V. This heavy equipment was loaned in a cooperative spirit by these two industrial companies to the Government and people of Bonaire at the request of Tom Van't Hof, a representative of STINAPA, which is the foundation responsible for Bonaire's National Park and Marine Park.

The moorings, which are totally unmanageable by conventional means, were handled with ease by the experienced crew aboard the huge barge. Some split-second timing was required however, between the tug, barge and the divers in the water. This effort was coordinated with the use of the VHF radio by Bill Van Loon, the marine superintendent of Bonaire Marine Services. Dive services were provided by Peter Hughes and a staff from his company, Dive Bonaire N.V., with the assistance of a representative of the Bonaire Diving Club and, of course, by the Marine Park personnel.

The installation of these moorings represents the first phase of a projected total of up to 40 moorings to be placed around the coast of Bonaire. The moorings will be available for use by all dive-charter vessels, privately owned local boats, as well as visiting yachtsmen. It is believed that the project will reduce reef damage due to anchoring to an absolute minimum, and will further enhance Bonaire's appeal.



TIPS

To Insure Perfect Scuba

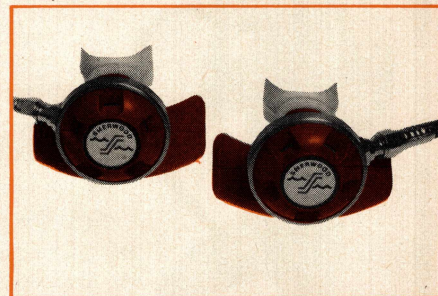


GIVE EXTRA ATTENTION TO YOUR OCTOPUS

Diving with an octopus regulator is a good safety precaution for emergency breathing situations, but it will only be useful if it's in top operating condition, readily accessible and clearly visible at all times.

Problems often occur when an unattached octopus collects sand or strikes an object and becomes damaged. So when you dive, be sure that your octopus is securely clamped to your diving equipment or your BC.

Also it's important to place your octopus in a conspicuous location. Let your diving buddy know where it is and the easiest way to get it. Make a habit of clamping it in the same spot on each dive to eliminate confusion when it is needed.



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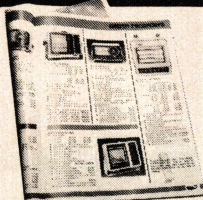
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Parkway Fabricators has reorganized its North American sales force. The advent of the new decade coincides with a host of new products — lycra wetsuits, jetsuits, BC's, and many new patterns and accessories.

The new sales force consists of: Marty Bergin, Southeast & Canada; John Stella, New England States; Brian Smith, Mid-Atlantic States; Tom Hopkins, Florida; Jim Breuning, Midwest & Alaska; Keith Chodak, Western States.

DE GENNERO PROMOTED AT SCUBAPRO



Dorothy De Gennero has been promoted to credit manager for Scubapro. Dorothy has been employed at Scubapro in a variety of positions. For the last two years she has been a buyer in the purchasing department.

DIVERS AND ARCHAEOLOGY

Communication and education leading to greater cooperation was called for by divers and archaeologists attending the National Scuba Workshop, February 15-18, at Newfound Harbor Marine Institute, Big Pine Key, Florida. The purpose of the workshop was to bring together divers and professional U/W archaeologists to discuss ways the two can work together to preserve, protect and enjoy underwater archaeological heritage.

The conference proceedings will be transcribed for publication. Videotape taken during the six workshop sessions by the Learning Resource Laboratory, Media Center, Florida International University, will be edited into a 28 minute program for educational television. This video program, on 3/4 inch cassette tapes, will be made available to interested dive groups by next spring.

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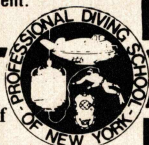
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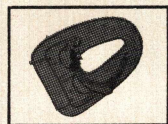
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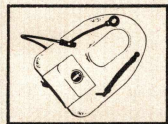
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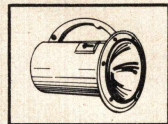
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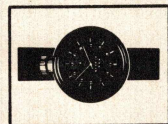
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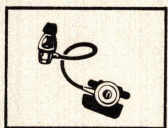
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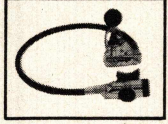
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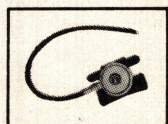
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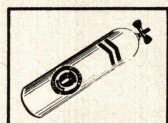
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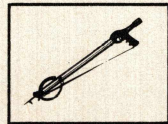
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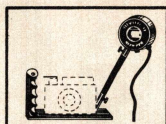
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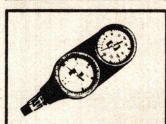
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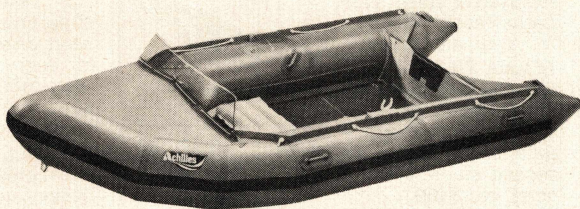


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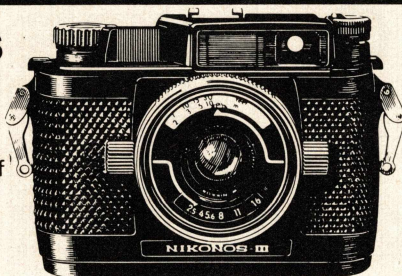


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The salvage operation relied exclusively on 800 tons of lift provided by Automarine equipment; individual bags used ranged in lift capacities from one to ten tons. The entire operation, from the setting out of all necessary rigging to the final tow into Plymouth Harbor, took nine days. The operation, undertaken from a depth of 45 feet is a record salvage lift using the air lift bag technique. 🐟

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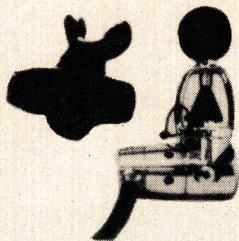
The Diving Dentists Society, Inc., will meet at Pennekamp State Park November 7-9, 1980. The Society emphasizes solutions to the dental problems divers have. Membership inquiries are invited from dentists who are certified divers. If you have any diving problems of a dental nature you would like to have answered, write to Don N. Brotman, D.D.S., Secretary, Diving Dentists Society, Inc., 1101 N. Calvert Street, Baltimore, MD 21202. 🐟

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Florida League of Angler's President Robert C. Schwebke urges all Florida fishermen to unite behind Senator Warren Henderson's SB46 and Representative Tom Gustafson's HB406 and request their respective legislator's support. The fate of these important bills, which will ban the use and possession of fish traps in Florida salt waters, will be decided during the current session of the legislature.

For information concerning these bills, contact Walter M. Hundley, Executive Director, Florida League of Anglers, Inc., Box 1597, Winter Park, FL 32790. 🐟

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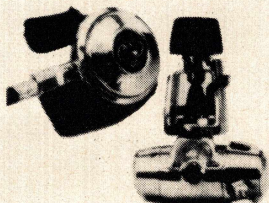


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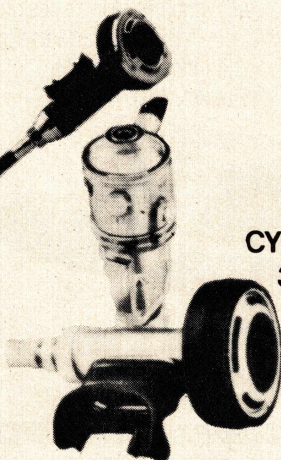
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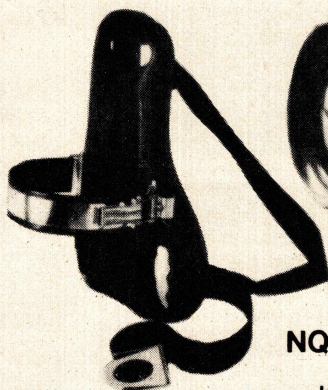


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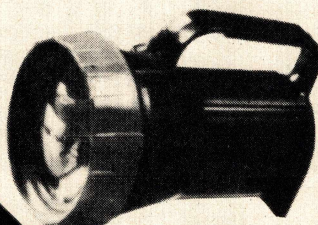
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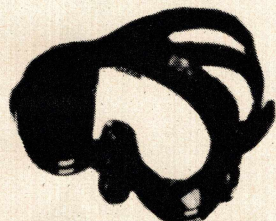
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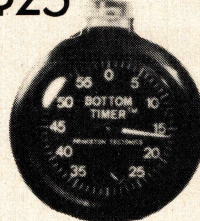
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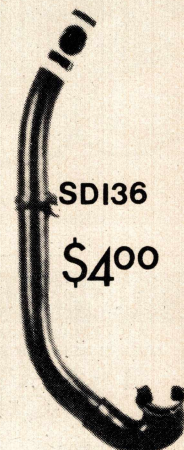
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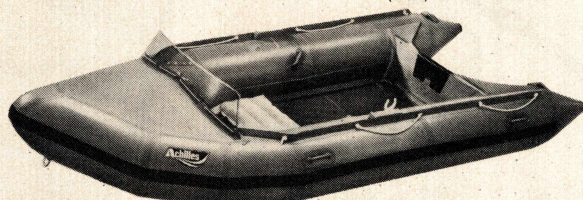
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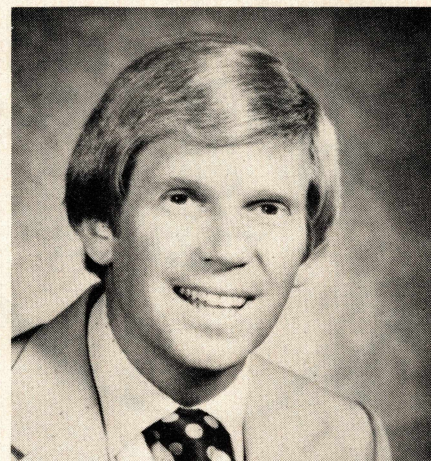
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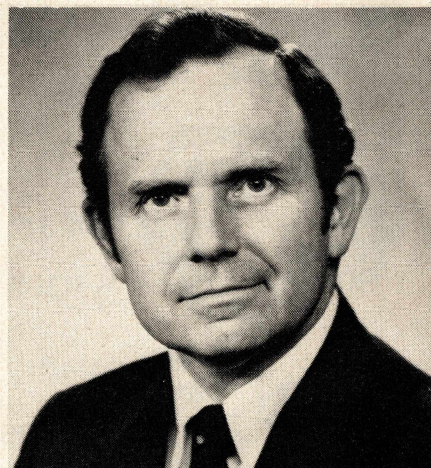
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The appointment of Francis E. Skop as vice president-marketing, and N. A. "Tim" Borges as vice president-operations at Sherwood Selpac Corporation, was announced by L. Orin Lindquist, president.



Mr. Skop joined Sherwood Selpac in 1962 as chief engineer and has served successively as engineering manager, product development manager, sales manager, and marketing manager. Mr.



Borges came to Sherwood Selpac in 1973 as manager of manufacturing and served subsequently as operations manager before his recent appointment.

NESBITT'S 100TH CLASS

Allen Nesbitt, Senior Instructor at the Commercial Diving Center, Wilmington, California, will celebrate his 100th class anniversary in May. Allen has been an instructor at the Los Angeles Harbor based deep sea diving school since 1970, when he joined the school after 26 years in the U.S. Navy as a Master Diver and Chief Boatswain's Mate. He worked for a short time as dive foreman for a commercial diving firm in Los Angeles Harbor before joining the instructional staff of CDC.

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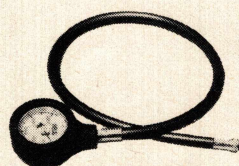


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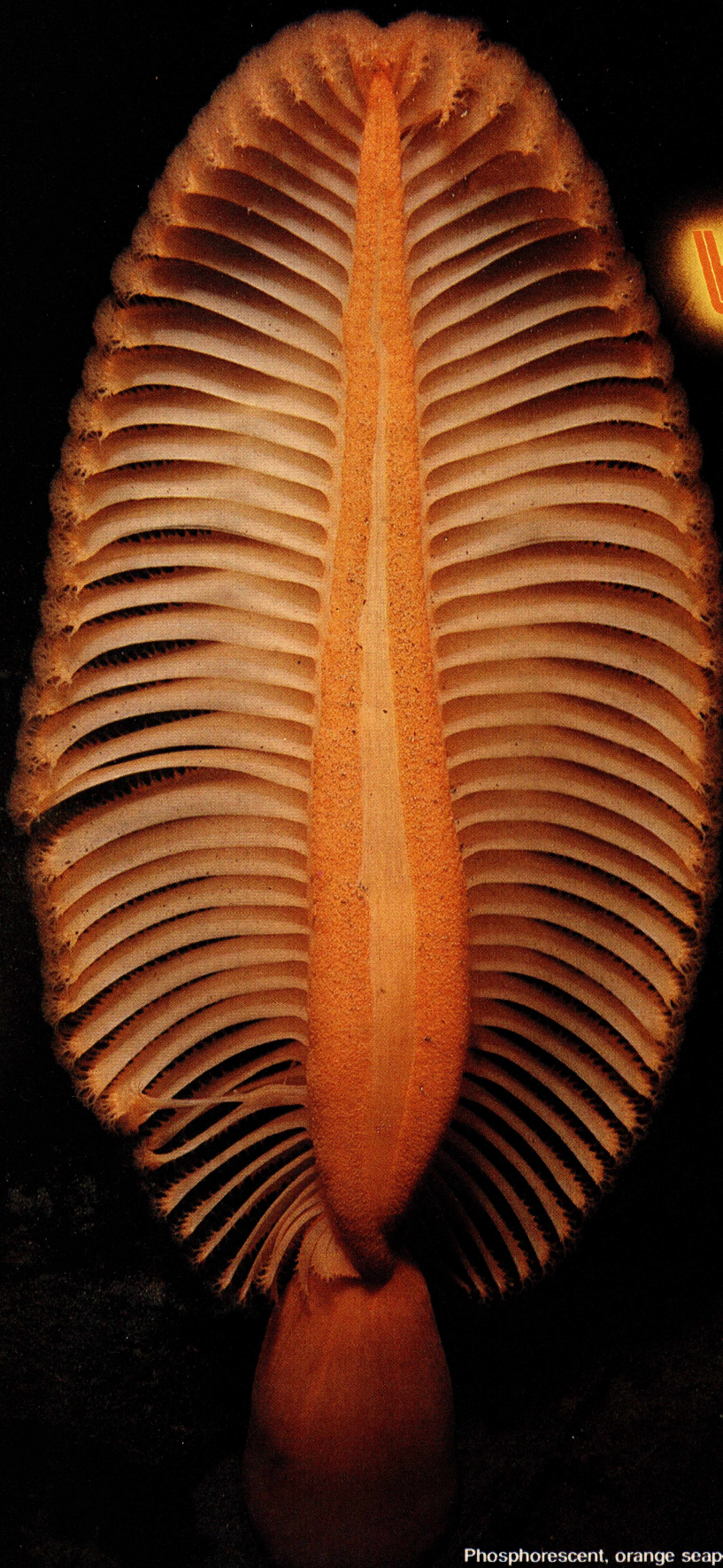
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VANCOUVER AT NIGHT

Midnight Magic in the Pacific Northwest *By Betty Pratt-Johnson*

Sparkles of silver burst like rockets as we snorkel through the black night. When we pause at the marker, dark settles like a comfortable curtain cutting off most of what we usually can see, focusing and simplifying the scene. Ryan and I sink slowly through the moonless, midnight March sea at Whytecliff Park.

Ryan Leverkus is visiting from San Diego. And I'm taking her for the most magical trip of all: Vancouver — at night!

Minutes from the heart of Canada's largest West Coast city, you can dive a dozen different sites at night. The Pacific Northwest has some of the richest, most colorful and varied marine life in the world. When the sun sets it becomes even more fantastic. Night transforms the scene. Even if you've been to a site many times, after dark it becomes a new place.

Beaming in on a bright orange seapen at 50 feet, I switch off my light and signal Ryan to do the same. Reaching toward it in total darkness, my forefinger becomes a living, human sparkler, and as I touch the seapen an immense chiver of neon green moves up one side, arcs over the tip, and washes in a wave down the other side of the six-inch feather. Ryan also reaches out. In response to her caress, each delicate feathery petal glows green. Continuing

Phosphorescent, orange seapen flourishes in Vancouver waters.

photograph by Phil Edgell

to stroke the stalk from which the feathers project, we see a steady green glow shimmer from the backbone of this colonial animal which is made up of many creatures. For at least five minutes, Ryan and I continue exploring the light system of the seapen, fascinated, savoring this ethereal sight. But phosphorescence is only part of the nocturnal seascape.

Other special treats I've seen at night? Octopuses roaming; a sailfin sculpin lazily rippling its sail-like dorsal fin; a two-inch stubby squid glowing like an opal teardrop pendant; glimmering, changing from blue to green to gold as we watched. Ratfish, prawns, and a midshipman — all animals of the night.

The rocky cracks and crevices of Howe Sound are haunted by octopuses at all times, but during daylight you can usually only find them curled up under ledges, sleeping. At night the shy giants are more likely to come out to hunt for food, or friends. Octopuses are intelligent, curious, and sometimes become acquainted with divers. Once an octopus's lair is located, it is possible for a persistent diver to return to visit this territorial creature again and again. Weighing up to 118 pounds, 10 ounces, *O. dofleini* is the largest species of octopus in the world. Most dramatic because of its size, postures and antics, it is marvelous to photograph.

Diving over the sand at night yields another whole new experience, a contrast, because you see a variety of very small fish. One April at 11 pm, heading out over the white sand at Copper Cove . . .

"Blub, blub. Ook! Awk!" It attracted my attention, as it was meant to do, but I didn't know if Phil Edgell was choking, or what. Then I saw him pointing to a small fish, about one and one-half inches long and white, most insignificant looking. But, as I watched, I almost became mesmerized by its rippling silvery tail. Next to it, we saw a four-inch fish that was curled up tightly and looked very stiff, as if rigor mortis had set in. An eelpout, I later learned. When touched, it moved reluctantly. Night is an excellent time to observe, for so many different creatures are out. And at night, they seem quite tame.

Ratfish glided up to our lights, butted against them and went on; their eyes gleaming aquamarine. Deep orange shrimp jumped like mosquitoes all over the bottom.

Another, "Ook, awk!" This time I knew Phil wasn't choking. He'd just seen something. It was a spider crab. Then a flounder, brown spotted and rather sluggish, sat under Phil's touch and mine, then shot away. Hermit crabs scurried as we approached. Looking up

we saw three huge white plumose anemones — the largest about three feet tall — towing over us.

Photographers can take pictures of flatfish on the sand more easily at night than during the day: Mottled sanddabs, lemon sole and C-O sole. There are interesting little fish too: Whitings, roughback sculpins, and maybe a decorated warbonnet. Or you might see a midshipman with a row of phosphorescent dots gleaming along its side like brass buttons.

Hungry? Like more action? Want to catch prawns? Again, go only 12 miles out of the heart of Vancouver to Copper Cove in Howe Sound. Or, to Larsen Bay Park. Or, a few miles farther north up Squamish Highway to Sunset Beach, Lions Bay, Brunswick Beach, or Porteau — all places with easy access to the water from shore. You don't need a boat. But don't forget your goodie bag. Prawns are too deep to catch in the day, but at night, down 70 to 100 feet over the sand, you should have a scrambling good time and find the makings of a great meal.

More sites are on the other side of the city in Indian Arm. "My favorite place for a night dive is Deep Cove," George Brooks says. "The lack of current makes it really easy for beginners, and it's safer for everyone at night when there are no boats." The same for nearby Cates Park in North Vancouver, where you can find snake pricklebacks, hermit crabs and seapens. And, on the other side of the arm in Burnaby at Texaco Wharf, you might find old bottles; and for sure you will see Dungeness crabs and a field of seapens glowing in the dark. Whiskey Cove, on the loco side of Indian Arm, is a safe and pleasant dive, day or night.

All of this within 30 miles of the center of Vancouver — enough diversity for 1001 nights!

But what about hazards, you ask. No man-eating sharks in these waters: A male lingcod guarding eggs is probably the most dangerous creature you will ever meet. This is one of the secure features of Vancouver night diving. However, one spring night at Whytecliff Park I was straggling behind a group of five divers when suddenly I felt a sharp pain in my leg. "Doggoned urchin!" I thought. I brushed it off with my hand, thought no more of it, and continued our dive.

Comparing notes afterward, Lesley Munroe, who followed me, said it was a ratfish, probably annoyed by our many lights. Not only had it bitten me, it had tried to bite Phil Edgell's chest and then his arm, she said, but he had not even felt it through his nylon two-side suit. When I took off my skin two-side, farmer Jane, I could see paired holes like a dog bite in my leg; in two weeks the bruise had

disappeared, but the holes remained for a year. Now it is the memory we laugh about when we remember that dive.

Diving at Sunset Beach, you may meet the harbor seal in residence; a hazard only if you are taken by surprise and panic. Many divers have made friends with this seal.

Probably the only potential problem specific to night diving in this area is the danger of waves caused by passing ferries. When you ascend and see a ferry, plan to stay away from shore when the waves reach you, so you will not be dashed onto the rocks. Even though no further problems present themselves for night divers in the Pacific Northwest, it is sensible, as always, for visitors to obtain advice from a dive shop or try to dive with locals who know the sites. This is particularly true for Whytecliff Park and Lookout Point where there is a current.

Seasons for night diving? In winter when night comes early, at about 4 pm, it is really easy: You don't have to stay up so late to see nocturnal animals come out. Summer is the favorite season of many, because it is fun to catch prawns and come up to gather around a big bonfire on the beach. Autumn is supposed to be the best time for phosphorescence. But my most spectacular "light show" to date was at Whytecliff Park in spring. For me, night diving is an easily accessible, year-round pleasure.

And so it can be for visitors.

While Ryan and I were beneath the water, March 15th became the 16th — what a way to start a new day! Hovering over the 700 foot drop-off at Whytecliff Park at midnight on a moonless night has got to be one of the biggest diving "highs" you can find anywhere.

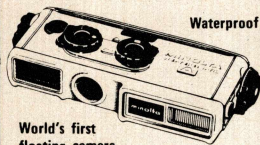
For photography, food, fun — and sheer sensation — visit Vancouver and go diving at night.

APRES DIVE

Troll's, at Horseshoe Bay, is the traditional gathering place after a dive in Howe Sound. On On Tea Garden in Chinatown serves the best inexpensive meal in town for two or twenty, but they are not licensed, so BYOB, and gather around one of their huge round tables. Other inexpensive diver's haunts are The Only on East Hastings for cheap tasty seafood eaten elbow-to-elbow with burns, and the Afghan-Horsemen Restaurant for Middle Eastern fare. More expensive and also good: Seafood at The Cannery; great Greek atmosphere and food at Kozmas; authentic North American Indian menu at Muckamuck, delectable and different; or the ultimate, sophisticated French dining in delightful surroundings before a snapping fire, at La Cote d'Azur. ➤

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FISH WATCHING AND BOTTLE HUNTING IN CHAUTAUQUA LAKE

Text and Photography by Bill King

Suspended in the water, my partner and I gazed somewhat anxiously at the sleek, silvery five foot long fish. The fish, too, hung suspended by the old wooden pilings, returning the gaze. I quickly adjusted the settings on my Nikonos and moved closer, snapping pictures of the large muskellunge. With a flick of his tail, the muskie moved off. I followed him with my camera as he slowly encircled us, swimming by in easy, rhythmic undulations. His apparent curiosity satisfied, the muskie regally departed into the green shroud of water surrounding us. It was my first encounter with a muskie, a freshwater game fish highly prized and respected by fishermen for its fighting ability.

We were diving in Chautauqua Lake, located in the southwestern corner of New York State. Although I had been diving Chautauqua for the past five or six years with other members of Erie, Pennsylvania's Blue Dolphin Skin Divers, it was the first time I had ever noticed such large fish and so many fish in freshwater.

On this particular dive I saw several muskie three to five feet long, a number of two foot long bass and numerous smaller bass, perch, pickerel, and sunfish. I was amazed at the abundance and variety of life. It was as if we were sharing a large aquarium with the plants and fish. The big muskies took note of us and seemed curious about our presence. They appeared calm and aloof; with their size and their teeth nobody was going to disturb them. The big bass kept their distance at first, but if we remained in one place they eventually swam back and forth in front of us. Some stopped directly in front to get a good look at the strange fish in the black suit making clouds of bubbles. They were a bit more jumpy than the muskie, swimming away at the click of the camera. The smaller bass kept to their holes and caves in the rock piles and among the pilings, just peering out to see the newcomers. And schools of inch-long sunfish behaved as they would with any big fish, darting off into the weeds.

Why hadn't I noticed all these fish during countless other dives in Chautauqua? For one thing, I was looking for them this time. I was trying to obtain good pictures of the near-shore underwater environment of Chautauqua at the Mayville and Lighthouse Point areas. My intent was to develop a slide presentation which would illustrate various eco-

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logical and limnological concepts. A big assistance to looking for aquatic life was the visibility of 10 to 15 feet on the several days in May that we shot pictures. In our area we are used to three feet, so ten to fifteen is, in fact, very good. If you can only see three feet, your chances of viewing any fish are somewhat reduced. Another factor in keeping fish out of view is the heavy plant growth; it begins to grow in the spring and the vegetation is up to the surface by the end of summer.



If the visibility is down and the weeds are up, fish watching becomes next to impossible; so what does one do? Well, Chautauqua Lake offers the diver some of the best and most numerous areas in which to find artifacts — chiefly old bottles. History has indulged man's incorrigible passion to litter this picturesque lake. Wherever people congregate on or near the water they deposit a record of their preferred beverages. In fact, people still do compile such a historical record. It's not proving as durable, though — all those cans are rusting away. However, the heavy glass containers so much in use years ago are abundant.

Since members of the Blue Dolphins began diving Chautauqua Lake most have become hard-core bottle divers, recovering literally hundreds of old bottles from this lake. The bottles we have found generally date back to the late 1800's. It's quite interesting to see the many different shapes, colors, and embossings of the bottles found. It's great for getting a historical perspective of the way people lived back then. Usually, the bottles are fairly common milk, pop, and beer containers, but occasionally we run across something a bit different. For instance, at one area we brought up bottles with round or pointed bottoms. Later we discovered that they had contained carbonated beverages, had been stoppered with a cork, and in order that the cork be kept moist to provide a good seal on the carbonation, they had been designed to lie flat. Some of the other bottles that have been found are crockery bottles and jugs, medicine bottles, and whiskey bottles and flasks. One of the best finds brought up from Chautauqua's bottom is a flask dating before 1860 which has "Success to the Railroad" embossed on both sides. Although the values of such antiques are difficult to ascertain, this one flask is said to be worth about \$300.

In addition to old bottles, other artifacts are occasionally found. A diver

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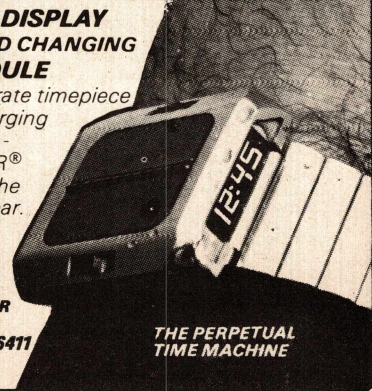


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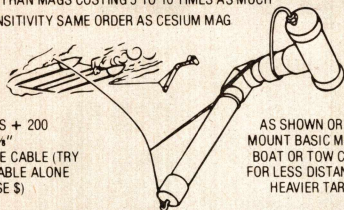


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By William M. Busch

Bull Shoals Dam is located on the main stem of the White River in Missouri and Arkansas. Nestled in the middle of the Ozark Mountains, it has multiple purposes. Construction in the upper White River Basin is for flood control and hydroelectric power generation. But the region has 6036 square miles of rocky and sandy drainage areas, offering excellent recreational outlets for skiing, sailing, and scuba diving.

The visibility is excellent for a Midwestern body of water. It has rocky shoals and clean water drainage. The maximum height of the dam above the stream bed is 256 feet, and there are 1000 miles of rugged shoreline.

Commercial docks on the lake have boats, motors, and guides. Maximum boat and motor rental rates are determined by the Corps of Engineers; they have also provided strategic launching areas for those who bring their own boats. Location markers are posted in conspicuous spots to help prevent divers and boaters from becoming lost.

There are motels, efficiencies, and camping and picnic facilities with grills, firewood, tables, and drinking water. Sanitary facilities are convenient to both camp and picnic grounds. Nearby towns offer a variety of modern accommodations as well as additional recreational outlets. There are also several dive shops and air stations around the lake.

Many scuba divers come to Bull Shoals to enjoy spearfishing of rough-scaled fish. Boating, fishing and dive flag regulations are strictly enforced, and are regulated by state and Federal laws.

About 15 percent of the shore is lined with vertical bluffs, as high as 300 feet above the original river basin. The lake has a submerged forest which starts at approximately 60 feet below the power pool. Visibility has been as good as 45 feet on the vertical and 25 feet on the horizontal, making for some fine underwater photography. While sightseeing along the bluffs, one may expect to encounter schools of blue gill and large mouth bass, as well as catfish, turtles, gar, shad, drum, suckers, buffalo, red horse and so forth. The temperature on the surface varies from 88°F to 32°F.

Spearfishing for carp is the name of the game here. These fish are elusive, but as a catch, gallant fighters and mighty good eating. Fish taken from such clean waters are quite good, and can be prepared in a variety of ways; from frying, baking and smoking to pickling and carp chowder, just to mention a few.

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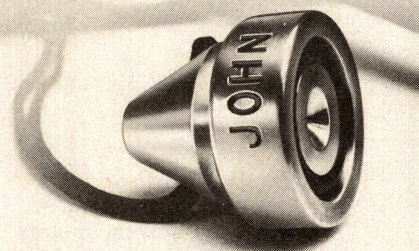
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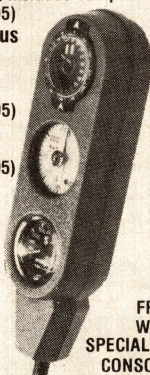


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Photographers are advised to leave their cameras on shore, for visibility will not exceed six-seven feet in carp fishing areas. At times you cannot see your hand in front of your face. Carp feeding environments usually range from 5 to 15 feet in depth and on soft, silty bottoms; the silty the better.



photograph by Jerry Griffen

Coves studded with trees and soft bottoms provide an optimistic setting for spearfishermen. While spearing you must learn patience; for you will have to stalk your prey carefully. If you are in a brushy environment, lie motionless in a position where you can pivot your gun 180 degrees without interference of any brush. Next, make a grunting noise through the mouthpiece of your regulator, while lying as still as possible. Believe it or not, it will attract carp from within as much as a 25 yard radius. If one were within a moving cloud of silt, only the tip of the head should protrude.

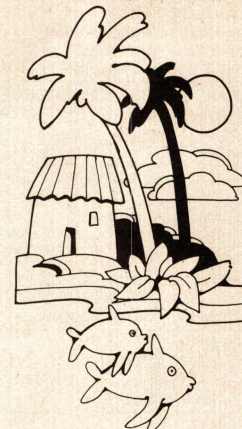
In the spring months of April and May, the carp will be especially active in the shallows as they prepare to spawn. Many times I have observed the dorsal fin protruding above the surface of the water in the shallows. Quite frequently, I have heard them break the water with a sudden loud splash. During these months, divers can really have a hey-day.

BOTTLE HUNTING

once found a dime from the late 1800's which was still in good shape. In the same vicinity an old, 100 pound anchor was found. It was probably used by one of the many steamboats that plied Chautauqua's waters years ago. The ferries shuttled passengers to and from the many towns around the lake. At many of these steamboat docking areas we have found artifacts. Other likely areas include the regions where amusement parks and hotels were located. Additional places which offer good diving are Mayville, Point Chautauqua, Lakewood, and Celeron, New York.

Today many cottages and houses surround the lake, but there are many sites which have water access. When in doubt about whose land you're on, it's always a good idea to seek permission. New York State law requires that the divers flag be flown. The best times of the year to dive are in early spring and late fall — the water is clearest, weeds lowest, and fishermen and boaters least numerous. So if you're interested in some nice fish watching or bottle hunting, come to Chautauqua Lake and have a good dive.

Divers Directory



Advertising rate is \$81 for three consecutive ads, \$139 for six consecutive ads, \$214 for a full year. **PAYMENT MUST ACCOMPANY COPY.** Send all material to Diver's Directory, c/o Skin Diver, 8490 Sunset Boulevard, Los Angeles, CA 90069.

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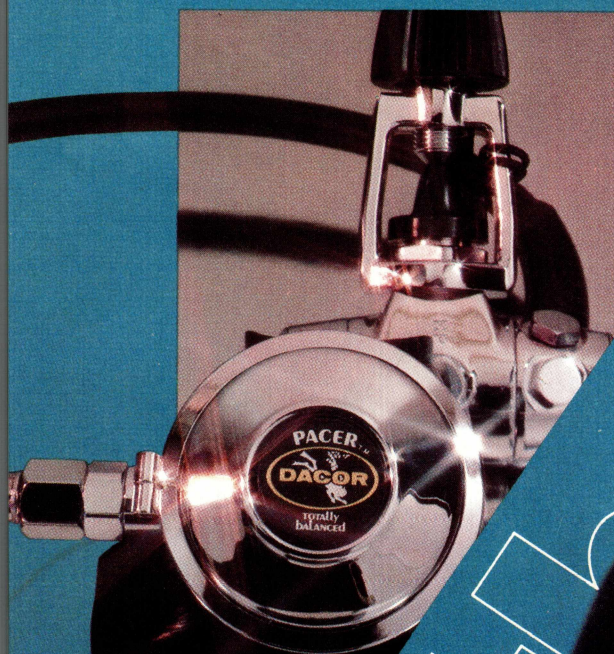
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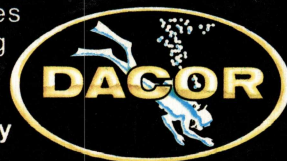
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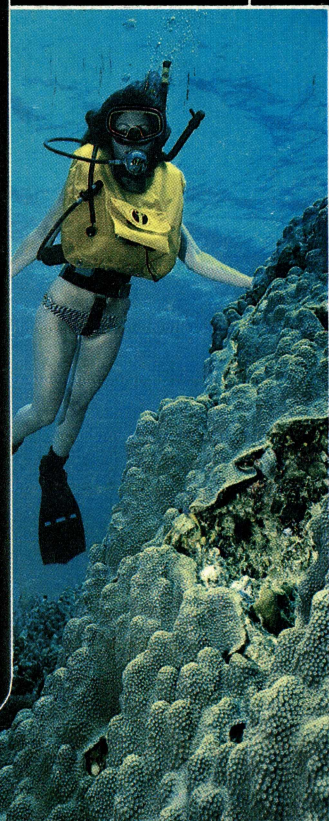
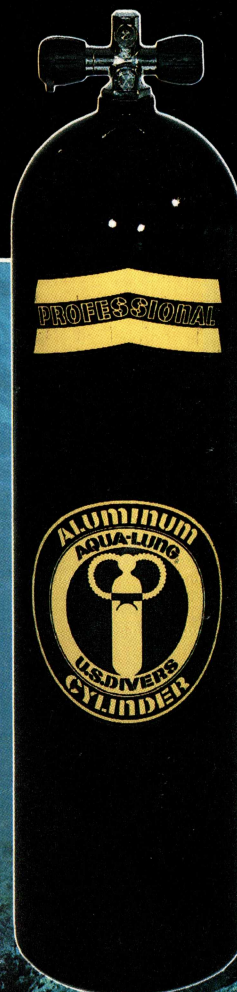
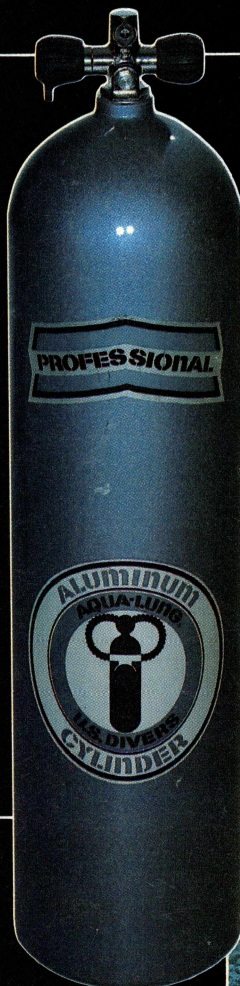
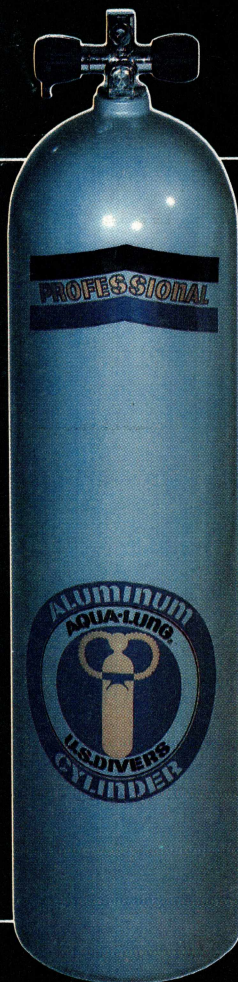
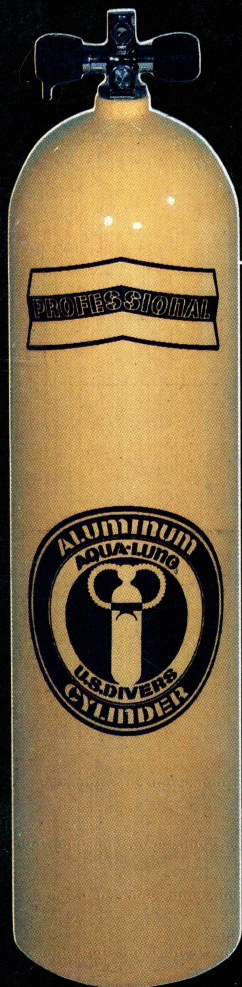
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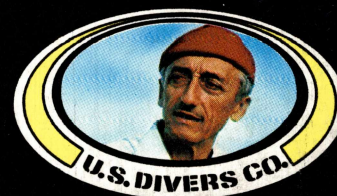
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